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Aquatic Plant Control Research Program

Australian Surveys (1985-1992) for Insect Biological Control Agents of *Hydrilla verticillata*

by *Joseph K. Balciunas, University of Florida*

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Prepared for Headquarters, U.S. Army Corps of Engineers

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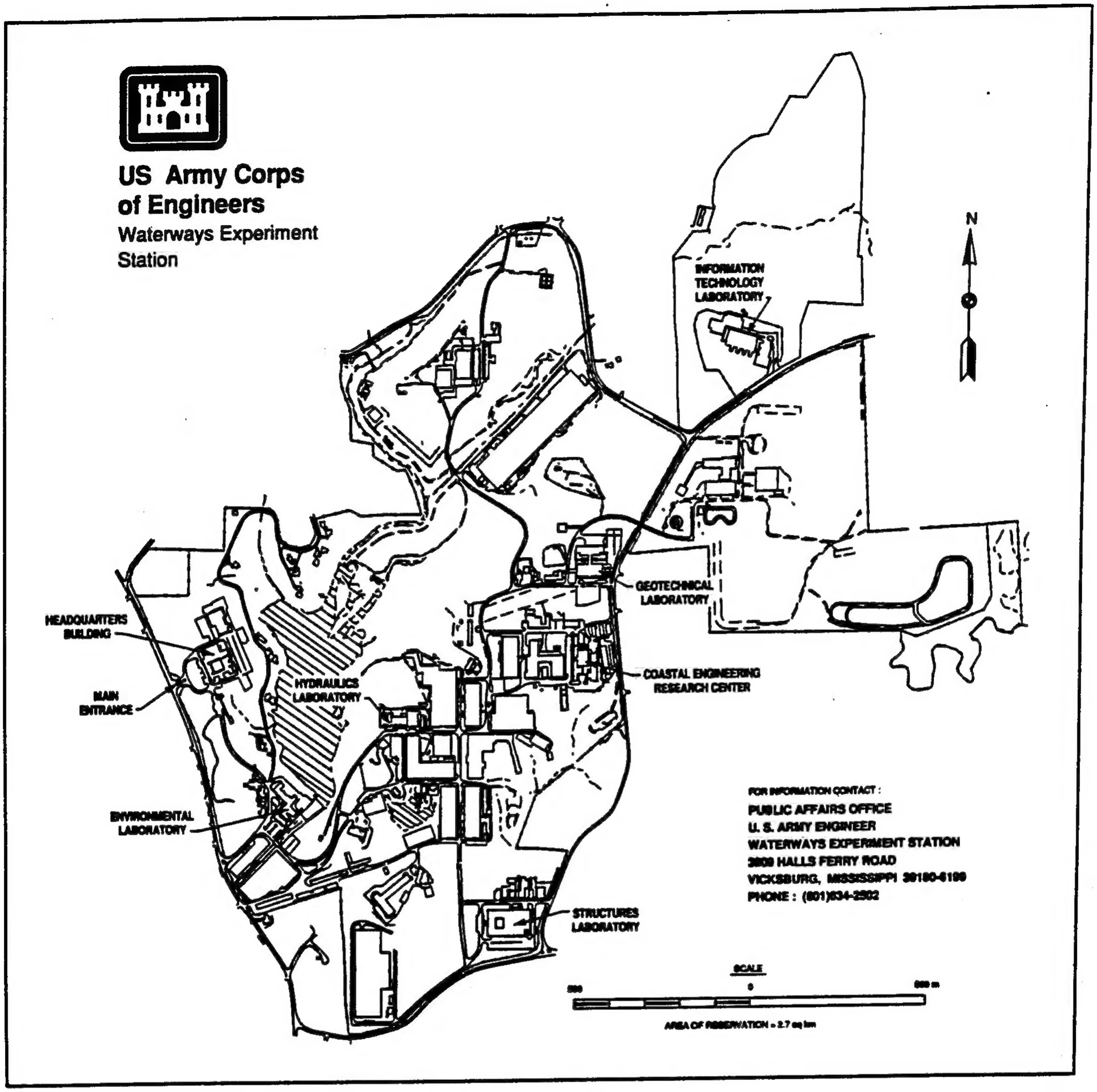

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Preface

The work reported herein was conducted as part of the Aquatic Plant Control Research Program (APCRP), Work Unit 31799. The APCRP is sponsored by the Headquarters, U.S. Army Corps of Engineers (HQUSACE), and is assigned to the U.S. Army Engineer Waterways Experiment Station (WES) under the purview of the Environmental Laboratory (EL). Funding was provided under Department of the Army Appropriation No. 96X3122, Construction General. The APCRP is managed under the Environmental Resources Research and Assistance Programs (ERRAP), Mr. J. L. Decell, Manager. Mr. Robert C. Gunkel, Jr., was Assistant Manager, ERRAP, for the APCRP. Program Monitor during this study was Mr. James W. Welcott, HQUSACE.

The Principal Investigators for this study and authors of the report were Dr. Joseph K. Balciunas, U.S. Department of Agriculture - Agricultural Research Service (USDA-ARS), Australian Biological Control Laboratory (ABCL), Mr. D. W. Burrows, Australian Centre for Tropical Freshwater Research, ABCL, and Mr. M. F. Purcell, Commonwealth Scientific Industrial Research Organization (CSIRO). The USDA Coordinator for this project was Dr. Ted Center, USDA-ARS Fort Lauderdale, FL.

The study was conducted under the direct supervision of Dr. Alfred F. Cofrancesco, Jr., Aquatic Ecology Branch (AEB), Ecological Research Division (ERD), EL, and Dr. Edwin A. Theriot, Chief, AEB, and under the general supervision of Dr. Conrad J. Kirby, Chief, ERD, and Dr. John W. Keeley, Director, EL.

Funds for the hydrilla project were provided primarily by WES. The waterlettuce project was funded by the U.S. Army Engineer District, Jacksonville. Administrative support was primarily provided by the University of Florida, Fort Lauderdale Research and Education Center, in conjunction with the USDA Aquatic Weed Laboratory, Fort Lauderdale, FL.

Our thanks to Drs. Theriot and Cofrancesco who served as WES liaison officers and ensured a continuous flow of funds for this long-term project, and to USDA's Aquatic Weed Control Laboratory scientists, Drs. Gary Buckingham, Center, and Kerry Steward for their advice. We appreciate the assistance of Drs. Ken Harley, Rhondda Jones, and Ray Volker in establishing our Australian laboratories. Our thanks to Mr. Ted Edwards, who identified

the aquatic moths; Drs. Charlie O'Brien and Elwood Zimmerman, who identified the aquatic weevils; and Dr. Ian Bock, who identified the Ephydridae flies. Finally, we would like to thank the succession of student/postgraduate assistants whose hard work made this project a success—Clair Fell, Ray Giddins, Ros St. Clair, Tony Vernon, and Steve Wauchope.

Director of WES was Dr. Robert W. Whalin at the time of publication of this report. Commander was COL Bruce K. Howard, EN.

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
acres	4,046.873	square meters
feet	0.3048	meters
inches	2.54	centimeters
tons (2,000 pounds, mass)	907.1847	kilograms

1 Introduction

This report covers the research performed in Australia between 1985 and 1992 to find, evaluate, and ship Australian insects for use as biological control agents of hydrilla in the United States. The majority of the research was conducted at the University of Florida Biological Control of Aquatic Weeds Laboratory in Townsville, Australia, and its satellite laboratory in Brisbane, Australia. In mid-1989, both of these facilities became the U.S. Department of Agriculture Australian Biological Control Laboratory (ABCL). This research was funded primarily by the U.S. Army Corps of Engineers, Waterways Experiment Station (WES).

Table 1 lists the aquatic plants discussed in this report and provides the codes by which these plant species are referred to herein. Table 2 lists the abbreviations used in the text for geographic regions and institutions.

This report is arranged into chapters. Chapter 2 presents a general overview of the hydrilla problem, its distribution, and its introduction and spread throughout the United States. Chapter 3 summarizes the history of locating and establishing biological control agents for this weed. Chapter 4 discusses our laboratories in Australia and the climatic conditions encountered there and provides a complete list of our sites, along with brief descriptions of our more important sites. Chapter 5 provides a general overview of collecting, processing, and rearing procedures, as well as summarizing our collection efforts for each plant species, in the different regions, and for each laboratory. The next three chapters cover research into the three most important insect groups encountered during this project. Chapter 6 summarizes our extensive field and laboratory data on the hyrdilla stem boring weevil (HSB), *Bagous hydrillae* O'Brien. Chapter 7 presents our field and laboratory data for the hydrilla leaf-mining fly, *Hydrellia balciunasi* Bock. Chapter 8 presents our field and laboratory tests for the aquatic moths. The remaining insect herbivores encountered are discussed in Chapter 9. Chapter 10 summarizes the herbivores shipped to the Gainesville quarantine facility in Florida, and discusses the techniques involved. Chapter 11 summarizes the achievements of this project and presents recommendations for additional research.

Appendixes A-K supplement the information contained in the main text.

Table 1
Aquatic Plant Species and Their Codes

Taxa	Family	Species	Code
PTERIDOPHYTA			
	Azollaceae	*Azolla pinnata?* R. Br.	Azo
	Salvineaceae	*Salvinia molesta* D.S. Mitchell	Sal
	Marsilaceae	*Marsilea ?drummondii* A. Braun	Mar
	Parkeriaceae	*Ceratopteris* Brongn. sp.	Cpt
ALGAE			
	Characeae	*Chara* L. sp.	Cha
		Nitella Ag. sp.	Nit
Angiosperma			
Monocotyledons			
	Aponogetonaceae	*Aponogeton* L.f. sp.	Apo
	Araceae	*Pistia stratiotes* L.	Pis
	Cyperaceae	*Eleocharis* R. Br. sp.	Elc
		Cyperus L. sp.	Cyp
		Scipus L. sp.	Sci
	Hydrocharitaceae	*Blyxa aubertii* Rich.	Blab
		Blyxa octandra (Roxb.) Thwaites	Bloc
		Elodea canadensis Michaux	Eld
		Egeria densa Planchon	Egr
		Hydrilla verticillata (L.f.) Royle	Hyd
		Hydrocharis dubia (Blume) Backer	Hch
		Ottelia alismoides (L.) Pers.	Otal
		Ottelia ovalifolia (R. Br.) Rich.	Otov
		Vallisneria gigantea Graebner	Vlgi
		Vallisneria spiralis L.	Vlsp
		Vallisneria ?spiralis L.	Vl?sp
	Juncaginaceae	*Triglochin procera* R. Br.	Tri
	Lemnaceace	*Lemna* L. sp.	Lem
	Najadaceae	*Najas tenuifolia* R. Br.	Naj
	Poaceae	*Leersia* Sw. sp.	Lee
		Oryza sativaz L.	Rice

(Continued)

Table 1 (Concluded)

	Pontederiaceae	*Eichhornia crassipes* (Martius) Solms-Laub	Eic
		Monochoria cyanea (F. Muell. F. Muell	Mon
	Potamogetonaceae	*Pontamogeton crispus* L.	Ptcr
		Potamogeton javanicus Hassk.	Ptjv
		Potamogeton ochreatus Raoul	Ptoc
		Potamogeton? pectinatus L.	Ptpc
		Potamogeton perfoliatus L.	Ptpr
		Potamogeton tricarinatus A. Bennett	Pttr
	Typhaceae	*Typha* L. sp.	Typ
Dicotyledons			
	Cabombaceae	*Cabomba caroliniana* Gray	Cab
	Ceratophyllaceae	*Ceratophyllum demersum* L.	Cer
	Convulvulaceae	*Ipomoea aquatica* Forsskal	Ipo
	Haloragaceae	*Myriophyllum trachycarpum* F. Muell.	Mytr
		Myriophyllum verrucosum Lindley	Myvr
	Lentibulariaceae	*Utricularia* L. sp.	Utr
	Menyanthaceae	*Nymphoides indica* (L.) Kuntze	Ndin
		Nymphoides crenata (F. Muell.) Kuntze	Ndcr
		Villarsia reniformis R. Br.	Vil
	Nelumbonaceae	*Nelumbo ?nucifera* Gaertner	Nel
	Nymphaceae	*Nymphaea gigantea* Hook.	Nygi
		Nymphaea mexicana Zucc.	Nymx
	Onagraceae	*Ludwigia hyssopifolia* (G. Don) Exell	Ldhs
		Ludwigia peploides (Kunth) Raven	Ldpp
	Philydraceae	*Philydrum lanuginosum* Gaertner	Phl
	Polygonaceae	*Polygonum ?decipiens* R. Br.	Pol

Table 2
Abbreviations for Geographic Regions, Institutions, and Organizations

Abbreviation	Location/Name
Geographic Regions	
NQ	North Queensland, north of Tropic of Capricorn
NSW	New South Wales
NT	Northern Territory
SQ	South Queensland, south of Tropic of Capricorn
Institutions and Organizations	
ABCL	Australian Biological Control Laboratory
ANIC	Australian National Insect Collection
ARS	Agricultural Research Service
CIBC	Commonwealth Institute of Biological Control
CSIRO	Commonwealth Scientific and Industrial Research Organization
JCU	James Cook University of North Queensland
TAG	Technical Advisory Group for Biological Control of Weeds
USDA	United States Department of Agriculture
WES	Waterways Experiment Station

2 Overview of the Hydrilla Problem

Introduction

Many plant species become serious weeds after being introduced to new areas that provide favorable growing conditions. At the time of introduction, these plants are usually free of natural enemies and can grow without interference from host-specific herbivores. These exotics often grow vigorously and become more abundant in their adventive range than they were in their native range.

Hydrilla verticillata (L. f.) Royle (Hydrocharitaceae) has spread rapidly since its introduction into the United States in the early 1950's (Schmitz 1990). During a 1991 survey by the Florida Department of Natural Resources, hydrilla was found to infest over 66,000 acres in Florida (Schardt 1992). Severe infestations of hydrilla impede water flow, hamper irrigation and flood-control efforts, restrict navigation, boating, and recreation, and can reduce fish stocks (Balciunas 1985, Langeland 1990). Drownings have occurred when swimmers became entangled in hydrilla (Balciunas 1985, Schmitz et al. 1991). Properties adjoining infested areas have had their values depressed (Balciunas 1985, Langeland 1990). Guerra (1977) reported economic losses attributed to the presence of hydrilla in a single, medium-sized, Texas lake (Lake Conroe) in excess of $30 million.

The most easily quantified of the losses entailed by the presence of hydrilla is the cost associated in attempting control. From 1980 to 1990, the cost of aquatic plant management programs in Florida was approximately $90 million (Schmitz 1990). Nearly two-thirds of the money spent on controlling aquatic plants in Florida was spent on hydrilla (Nelson and Galloway 1991). Between 1988 and 1990, $3 million was spent on controlling hydrilla in Lakes Hatchineha and Istokpaga alone (Nelson and Galloway 1991). With costs for herbicidal and mechanical control running at approximately $470 and $559 per acre, respectively (Nelson and Galloway 1991), and with several treatments sometimes required during the growing season, only high priority waters can be effectively managed. From 1988 to 1990, the number of acres of hydrilla that was controlled in Florida decreased from 18,358 to 8,771 due to decreased

funding. During that same period, the area of Florida's public waters where hydrilla was present increased from 52,600 acres to over 57,000 acres[1] (Nelson and Galloway 1991).

Identification Difficulties

Hydrilla verticillata has been recognized as a separate species since the early days of taxonomy. According to Cook and Luond (1982), Linnaeus' son published a figure of it (described as *Serpicula verticillata*) in 1781. In 1839, Royle was the first to correctly place it in the genus *Hydrilla*. However, throughout the nineteenth century, it was frequently placed in other aquatic genera such as *Udora, Elodea,* and *Vallisneria*. Many additional species and "varieties" of *Hydrilla* have been described in the literature. Most of the morphological variation in the leaves and stems, which caused the proliferation of *Hydrilla* species and variety names, is now known to be due to environmental factors. Thus, even though the chromosome number is not identical for all populations (i.e., polyploidy is evident), *Hydrilla* is considered a monotypic genus, containing only the species *verticillata* (Cook and Luond 1982).

Hydrilla was frequently misidentified when it first appeared in new areas. When hydrilla first started becoming a problem in Florida in the early 1960's, it was called Florida Elodea, reflecting the opinion that this was a new species or variety of native *Elodea*. It has also been confused with another member of the Hydrocharitaceae family, *Egeria*. When flowering, these three genera are easily distinguished, but botanists may still refrain from positively identifying sterile material. In the laboratory, the presence of small spines along the leaf margins, along with the fingerlike projections on the nodal scales, can be used to identify sterile hydrilla.

Weedy Characteristics

Hydrilla has a very wide ecological amplitude, growing in a variety of aquatic habitats. It is usually found in shallow waters, 1/2 m or greater in depth; however, in very clear waters, such as Crystal River, Florida, it has been found growing at depths of 15 m (Langeland 1990). Mahler (1979) and Steward and Van (1987) report that hydrilla can **tolerate** salinities around one-third of seawater. However, Haller, Sutton, and Barlow (1974) and Twilley and Barko (1990) experimentally demonstrated that hydrilla cannot **grow** at such levels of salinity. While hydrilla flourishes best in calcareous waters, it is also found in both acidic and alkaline waters (Balciunas 1985). It grows well in both oligotrophic and eutrophic waters, and even tolerates high levels of raw sewage (Cook and Luond 1982). Hydrilla is adapted to grow

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[1] A table of factors for converting non-SI units of measurement to SI units is presented on page xi.

under very low light conditions, and can grow at light levels of only 1% of full sunlight (Haller 1976). This ability to tolerate such a wide variety of environmental conditions may account for its rapid growth and dominance over native vegetation.

Hydrilla is usually a gregarious plant that frequently forms dense, intertwined mats at the surface. In Florida, approximately 20 percent of the plants' biomass is concentrated in the upper 10 cm of such mats (Haller and Sutton 1975). These subsurface mats can intercept 95% of the sunlight in the top 1 ft of the water column (Langeland 1990), thus shading aquatic plants below. The presence of dense hydrilla mats near the water's surface reduces wave action, and the plants absorb nutrients that would otherwise be utilized by plankton (Langeland 1990). This contributes to making water clearer, particularly in lakes, thus allowing hydrilla to encroach into deeper waters after its initial establishment in shallow waters (Haller 1976). Hydrilla can grow very rapidly, up to 4 in. per day in some areas of the Crystal River in Western Florida (Dick 1989). This extraordinarily high growth rate is probably due to the very clear and warm water of the Crystal River and the large amount of nutrients entering the river from human activities, such as farming, sewerage disposal, and erosion resulting from land clearing (Dick 1989). Once established in an aquatic system, hydrilla can spread very rapidly. Kozlowski (1991) cites the example of the Santee Cooper Lakes (Lakes Marion and Moultrie) in South Carolina. Hydrilla was first discovered there in 1982, but by 1987 it occurred in over 13,000 acres of the lake. Even more impressive was the growth recorded at Lake Istokpoga, where hydrilla expanded from 4,000 acres to 20,000 acres during 1988 alone (Schardt 1992). The plants spread quickly, with small fragments (a single node is sufficient) quickly developing adventitious roots which eventually produce an entire plant (Balciunas 1985). Hydrilla fragments on recreational boats and boat trailers appear to have been the mode of infestation of many new aquatic systems in Florida.

Origin and Distribution of Hydrilla

The center of origin of hydrilla is far from clear. Cook and Luond (1982, p 490), along with many other botanists, feel that "...its centre of origin lies in the warmer regions of Asia." However, hydrilla has been in central Africa for a long time. It was collected by John Hanning Speke during his 1860-1863 expedition to find the source of the Nile River (Speke 1864), and some botanists believe that it originated there (Tarver et al. 1978). Mahler (1979, p. 5) is even more precise, stating "...with a center of distribution or origin in southeastern Uganda and northwestern Tanzania."

Hydrilla is now almost cosmopolitan in its distribution. Antarctica and South America are the only continents from which it has not yet been recorded. It is very common on the Indian subcontinent and in many of the Middle East countries, Southeast Asia, and northern and eastern Australia (Cook and Luond 1982). It is also found in Japan, Korea, and Fiji (Pieterse 1981). The senior author (J.K. Balciunas) has collected hydrilla as far south as

the North Island of New Zealand, at a latitude of approximately 39°11′S. In the northern hemisphere, hydrilla is found as far north as Ireland, England, Poland, Lithuania, and Siberia (Cook and Luond 1982). The Siberian sites (Cook and Luond 1982), at about 58°30′N, are the furthest north that hydrilla is known to occur.

Distribution of Hydrilla in Australia

Hydrilla is widely considered to be native to Australia (Aston 1977; Sainty and Jacobs 1981; Stanley 1981; Swarbrick, Findlayson, and Caldwell 1981; Cook and Luond 1982), and it is present in every state except Tasmania (Aston 1977; Stanley 1981). The earliest published reference to hydrilla in Australia was by Mueller in 1854, who described material from the Murray River as *Udora australis* (Swarbrick, Findlayson, and Caldwell 1981). Bentham (1873, Vol 6, p. 259) reported collections of *Hydrilla verticillata* from several sites along Queensland's eastern coast and in the Northern Territory, and described the Australian form as being "...the typical one originally described from India." Hydrilla appears to be most common in the coastal regions of the Northern Territory, Queensland, and the northern portion of New South Wales. It appears to be far less common in Victoria and South Australia, where most of the known hydrilla collections have been restricted to (or near) the Murray River. There are a few, scattered hydrilla collection records for Western Australia, most likely reflecting the lack of suitable aquatic habitats in this dry state. Hydrilla's distribution in Western Australia includes the Fitzroy River and Geike George in the northwest (Aston 1977). The isolated occurrences of hydrilla in Perth, southern Western Australia, may be introductions (Swarbrick, Findlayson and Caldwell 1981). However, the increasing number of irrigation schemes and reservoirs should provide new sites for hydrilla in Western Australia. Lake Argyle, near the Western Australia/Northern Territory border, was created as part of the Ord River irrigation scheme and may provide a suitable site for establishment of a large hydrilla population.

Hydrilla's Introduction and Distribution in the United States

Florida's warm, subtropical climate and the presence of numerous lakes, rivers, canals, and extensive wetlands have allowed aquatic weeds, many of them exotic, to flourish. Coupled with wetland perturbations, human disturbance of aquatic systems, and the transfer (accidental or otherwise) of plants, conditions have proved suitable for the establishment and proliferation of weed species. Florida is also an entry point, and major production area, of both the aquarium and ornamental plant industries, which increases the likelihood of invasion by exotic plant species. Klose (1950) estimated the number of exotic plant introductions into the United States to be at least 180,000. Haller (1989)

estimated that 200,000 plants were introduced into the United States between 1889 and 1933 alone, which he equated to an average of 12 per day during that 44-year period. Ripley (1975) reported that 1,800 exotic plant species have escaped into the wild in the United States. Nearly 300 exotic plant species have become naturalized in south Florida alone (Ewel 1986).

Schmitz (1990) states that the original introduction of hydrilla into Florida was six small bundles of plants sent from St. Louis, MO, to Tampa, FL, and discarded into a canal in the early 1950's. According to Westbrooks (1990), these plants came from stocks imported from Sri Lanka (then Ceylon). Hydrilla was a popular aquarium plant in the United States for decades, and was usually sold as "star-vine" or "oxygen-plant." A big factor in hydrilla's popularity was its ability to survive at the low light levels typically found in home aquaria. Aquarium plant dealers colonized hydrilla in order to have a cheap, local source for this popular plant. By the late 1950's or early 1960's, hydrilla had "escaped" into several aquatic systems in Florida and was becoming a nuisance. It was first recorded in a Miami canal and in the Crystal River on Florida's Gulf Coast around 1960 (Haller 1976). The earliest U.S. specimen of hydrilla examined by the senior author (J.K. Balciunas) was collected in October 1962 at Big Lake Conway in Orlando, FL. Hydrilla may have been present in Central America prior to its establishment in Florida. Hartog (1973, p. 9) states, "The records from Panama are the first from the Americas," but unfortunately does not provide the date.

The spread of this plant throughout the United States during the last 25 years has been explosive. Hydrilla had reached Lake Seminole on the Florida-Georgia border by 1967, and the important aquatic systems of Lake Okeechobee in 1972 and the Orange-Lochloosa Lakes and Lake Jackson in 1974 (Haller 1976). By 1976, hydrilla was present throughout the canals of south central Florida (Haller 1976). By 1990, hydrilla had spread to all Gulf and Atlantic states, as well as Tennessee, Arizona, and California (Langeland 1990). Hydrilla is still expanding into areas where it was previously unrecorded. Since all of the 48 contiguous United States, much of Canada, and even some parts of Alaska, lie below the latitude of some sites in Siberia where hydrilla occurs, hydrilla may be climatically suited for growth in most of the North American continent (Balciunas and Chen in press).

3 Biological Control of Hydrilla - A Review

Introduction

Because hydrilla represents such a serious problem, it is a top priority for biological control. The 1982 report of the U.S. Department of Agriculture - Agricultural Research Service (USDA-ARS) Research Planning Conference on Aquatic Weed Control placed biological control of hydrilla near the top of a list of national aquatic weed control research priorities. That conference also identified foreign exploration for potential biological control agents of hydrilla to be of national importance, and the top priority for the Fort Lauderdale Aquatic Plant Management Laboratory. In a 1984 report, the USDA-ARS Research Planning Conference on Biological Control listed hydrilla as the top priority aquatic weed. Hydrilla control is also a top priority of the U.S. Army Corps of Engineers Aquatic Plant Control Research Program, which has financially supported the USDA-ARS effort to find and develop biological controls for hydrilla.

Both chemical and mechanical measures for controlling hydrilla are expensive and usually require multiple treatments during the growing season. Environmental concerns are restricting the use of herbicides and other chemicals. Accordingly, the use of living organisms that consume or otherwise stress hydrilla received increased attention.

Modern usage of the term "biological control" refers to the use of living organisms to suppress population levels of a pest. Among other things it includes the use of inundative and inoculative releases of endemic natural enemies, mass releases of sterilized pests, and enhancing the action of natural enemies. Some authors would also include certain cultural practices such as drawdowns and the use of host-resistant varieties as being biological control practices. Initially, the term "biological control" was more restrictive, describing the process of establishing introduced, foreign organisms to control an imported pest. The term "classical biological control" is now used to describe this traditional approach of reassociating a foreign pest with its natural enemies (usually insects) from its native range. An ideal biological control agent is highly specific, damaging only the target pest (and possibly a very limited

number of other hosts), and, once established, maintains population levels high enough to control the target pest.

Previous Successes in Controlling Aquatic Weeds With Insects

During the past 100 years, the classical approach to biological control has been very successful in controlling a wide variety of terrestrial weeds and insect pests. Classical biological control programs have also been successful in controlling several aquatic weeds. Alligatorweed, *Alternanthera philoxeroides* (Mart.) Griseb., waterhyacinth, *Eichhornia crassipes*, and waterlettuce, *Pistia stratiotes*, are very serious environmentally and are economically damaging aquatic plants in Florida and neighboring states. All three species have been controlled by insects evaluated and introduced into the United States through classical biocontrol programs. In Australia, along with successes in controlling the above-mentioned weeds, control of the aquatic fern *Salvinia molesta* by the South American weevil, *Cyrtobagous salviniae* Calder and Sands, has been reported at several locations (Room et al. 1981). This weevil has subsequently had spectacular success in controlling *S. molesta* in Papua New Guinea (Thomas and Room 1986), Botswana (Proctor 1986), and Sri Lanka (Room et al. 1989).

Domestic Search for Insects Damaging Hydrilla

Any thorough pest control program should consider the natural enemies already stressing the pest in its native range. Between July 1978 and August 1980, the senior author (J.K. Balciunas) conducted a survey of the macroinvertebrates associated with hydrilla in the United States. A total of 285 collections at 76 sites resulted in 59,010 macroinvertebrate specimens. Of these, 17,358 (29.4%) were insects representing 191 species. The insects which caused the most damage were the larvae of aquatic moths, with *Parapoynx diminutalis* (Snellen) and *Synclita obliteralis* (Walker) (both Lepidoptera: Pyralidae) being the most common (Balciunas and Minno 1985). *Parapoynx diminutalis*, an Asiatic species accidentally introduced into the United States (Del Fosse, Perkins, and Steward 1976), was the only insect showing a preference for hydrilla in the field. Midges (Diptera: Chironomidae) and leptocerid caddisflies (Trichoptera: Leptoceridae) were frequently numerous on hydrilla, but only occasionally caused damage. Further information on these surveys and a complete listing of the collection sites, species collected, etc., can be found in Balciunas and Minno (1984).

Previous Efforts to Locate Foreign Insects for Control of Hydrilla

Not long after hydrilla was correctly identified and its pest potential became evident in Florida, interest in finding a foreign insect to control it began to increase. The classical biological control approach is to search, within the plant's native range, for host-specific herbivores that are capable of slowing plant growth, then introduce these herbivores into areas where the plant has become a weed. Foreign exploration is thus an essential, integral part of classical biological control.

Although determination of the area of endemism of a weed is normally very important in a biological control project, this could not be ascertained with certainty for hydrilla, as its native range is immense, covering at least three continents (Africa, Asia, and Australia), as well as many island countries in the Indo-Pacific region (see Chapter 2; Origin and Distribution of Hydrilla). Therefore, a different approach was needed. Global surveys were undertaken to compile lists of the natural enemies of hydrilla throughout its native range. Surveys of hydrilla are more difficult than those of waterhyacinth, waterlettuce, or alligatorweed. Since hydrilla is often submersed, it is more difficult to locate and biocontrol agents are often not obvious. Rather than thoroughly survey in just a few areas, it was decided to briefly survey as many areas as possible. This decision was based upon the knowledge that the most important biological control agents are usually found early in the survey phase of their respective projects. For species such as hydrilla, which occupies a large, disjunct range, more potential biological agents were likely to be found by cursory sampling from a large portion of its range, rather than by thorough sampling from within a small portion of its range. Rather than establishing temporary foreign laboratories, the more economical approach of contracting foreign scientists to conduct most searches, along with short overseas trips by U.S. scientists, was the strategy employed. Appendix A briefly lists these foreign searches for hydrilla insects. Unfortunately, this strategy was not conducive to an early and rapid evaluation of potential biocontrol agents.

During the late 1960's, hydrilla was one of the major aquatic weeds on a long list of plants whose natural enemies were surveyed in India by Commonwealth Institute of Biological Control (CIBC) scientists. Of the several Nymphulini (Pyralidae) moths found on hydrilla, *P. diminutalis* (not then known to occur in the United States) was the most damaging and widespread (Rao 1969, Rao and Sankaran 1974).

The USDA-sponsored project, conducted by CIBC scientists in Pakistan between 1971 and 1976, was the longest and most thorough of the foreign studies (prior to the project reported herein). Of the 10 insects and 2 snails found damaging hydrilla during this survey, the moth, *P. diminutalis*, three *Bagous* weevils (Coleoptera: Curculionidae), and an ephydrid fly, *Hydrellia* sp. (Diptera: Ephydridae) showed the most promise as potential biocontrol agents (Ghani 1976).

In the early 1970's, Dr. George Allan of the USDA-ARS and the University of Florida made several short overseas trips and directed some effort at establishing hydrilla surveys with cooperating foreign scientists. It appears that only a US-AID/University of Florida project in Malaysia was completed. This project focused on pathogens, and the limited field surveys for insect enemies revealed only the moth *P. diminutalis*, while aphids (Homoptera: Aphididae) were found on the laboratory culture of hydrilla (Varghese and Singh 1976).

In 1976, U.S. scientists Robert Pemberton and Robert Lazor, under contract with USDA-ARS and U.S. Army Corps of Engineers, conducted a survey for natural enemies of hydrilla in eastern Africa. Hydrilla was not located until the latter portion of the 3-month trip. Of the few insects found to be possibly damaging hydrilla, the chironomid midge, *Polypedilum* sp. (Diptera: Chironomidae), was thought to be most promising (Pemberton 1980).

In the late 1970's, members of the U.S. Army Corps of Engineers collected specimens of *Parapoynx rugosalis* Moschler feeding on hydrilla in Panama. Tests conducted by the senior author (J.K. Balciunas) and Dr. Ted Center in Panama in 1980 showed a *Parapoynx* prob. *rugosalis* to be fairly specific to hydrilla (Balciunas and Center 1981). Although they did not realize it at the time, the moth species that they tested was not *P. rugosalis* but a new, undescribed species. Permission to bring this new species into Gainesville quarantine facilities in Florida was obtained, but three subsequent collecting trips failed to find the species which was tested, although it had been abundant during testing in 1980. Instead, only the common asiatic moth, *P. diminutalis*, which is already present in the United States (DelFosse, Perkins, and Steward 1976) was found.

In 1978, an organized systematic approach toward a world survey for natural enemies of hydrilla began. The first three years consisted of a domestic survey designed to delimit the species of potential biocontrol agents present in the United States, so that if these species are also found abroad, they would be recognized and loss of time and expense thus avoided (see previous section on domestic searches).

Two projects to explore foreign countries for natural enemies of hydrilla were established, one to survey in Africa and one to survey India and Southeast Asia. Both projects began slowly due to logistical problems (in the case of Africa) and the acquisition of the experience necessary to function efficiently abroad, often in underdeveloped areas. A third project to survey Australia could not be established at that time, so the Australian surveys were incorporated into the India-Southeast Asia segment. In Africa, the project worked in cooperation with a CIBC laboratory in Muguga, Kenya. Although known to occur in Kenya, no hydrilla was found there during these surveys. However, hydrilla was found in Uganda, Burundi, and Rwanda. Security problems and the political situation in Uganda prevented extensive surveys in that country. Hydrilla collected from Burundi in Lake Tanganyika showed considerable insect damage, but the causative agent could not be determined. Midge larvae (Diptera: Chironomidae) were found in the injured apices, but it

was not known if those were the same as those reported by Pemberton (1980). A die-back of hydrilla, presumably associated with a fungal pathogen, was also found. Pyralidae (Lepidoptera) moth larvae were found feeding on the hydrilla in Rwanda, as were herbivores Tilapia fish.

A cooperative agreement between the USDA and University of Florida was finalized in September 1980. This agreement provided for the employment of an entomologist (Dr. J. K. Balciunas) to conduct surveys for natural enemies of hydrilla throughout the native range of the species, other than Africa. While the advantage of this approach was that it was quickly implemented, the disadvantage was that the total geographical range to be surveyed was so great. The purpose of these preliminary surveys was to narrow down the search area and delimit regions in which to conduct more comprehensive work. Therefore, during a 3-year period (1981-1983), Dr. Balciunas spent a total of about 15 months traveling throughout India, Indonesia, the Phillippines, Southeast Asia, and Australia, searching for hydrilla and its natural enemies. Results of these surveys can be found in Balciunas (1982b, 1983, and 1984), with an overall summary in Balciunas (1985). Many phytophagous insects which fed on hydrilla were found during these surveys. Most of these were new, undescribed species.

Status of Exotic Insects Released in the United States for Control of Hydrilla

The first foreign insect found to be damaging hydrilla in the United States was *P. diminutalis*. A native of tropical Asia, this moth was first discovered in Florida in the mid-1970's (DelFosse, Perkins, and Steward 1976). *Parapoynx diminutalis* was probably accidentally introduced into the United States in a shipment of aquarium plants. It has spread rapidly throughout Florida since its discovery and is already damaging hydrilla at some sites (Balciunas and Habeck 1981).

The most thorough of the previous foreign surveys, by CIBC in Pakistan, noted a complex of at least 10 insects damaging hydrilla. The most promising of these, the tuber-feeding weevil, *Bagous affinis* Hustache (Coleoptera: Curculionidae), and the leaf-mining fly, *Hydrellia pakistanae* Deonier (Diptera: Ephydridae), have been evaluated in U.S. quarantine facilities and released at field sites. *Bagous affinis* was first discovered on hydrilla in Pakistan in 1974, but was not identified until 1985 (Buckingham 1988). The first shipment of four species of *Bagous* weevils was sent to the Gainesville quarantine facility by the senior author (J.K. Balciunas) in 1982 (Bennett and Buckingham 1991). The colonies of these weevils either died or were destroyed. Further shipments of *B. affinis* and one other undetermined *Bagous* species (later described as *B. laevigatus* O'Brien and Pajni) were sent from India in 1983 and formed the basis of colonies used for host-specificity testing. *Bagous laevigatus* developed better on turions of the Sago pondweed, *Potamogeton pectinatus*, than on hydrilla and its colony was destroyed (Buckingham 1988, Bennett and

Buckingham 1991). Successful evaluation of the host-specificity of *B. affinis* enabled it to be released at Lake Tohopekaliga, Osceola County, Florida, in April 1987 (Buckingham 1988). Adults of *B. affinis* feed on submersed and shore-stranded hydrilla stems during periods of high water. As water level decreases, females oviposit in hydrilla stems, moist wood, and soil. Emerging larvae then crawl through the soil in search of hydrilla tubers, into which they burrow and feed upon until mature. Pupation may occur within the tuber or in the soil.

The ability of hydrilla to survive and proliferate after drawdowns is one of the attributes that contribute to the status of this species as a serious pest. This weevil, *B. affinis*, has the capability to greatly reduce hydrilla's ability to recover after drawdowns. However, as the life cycle of *B. affinis* requires a decrease in water levels, the number of sites at which this weevil can become established is limited.

The hydrilla leaf-mining fly, *H. pakistanae*, was discovered in Pakistan in 1971. In 1975, the federal Working Group on Biological Control of Weeds denied a request for the entry of *H. pakistanae* into Florida quarantine facilities. Research on *H. pakistanae* was then curtailed until the early 1980's. During his overseas trips to search for herbivorous insect enemies of hydrilla from 1981 to 1983, Dr. Balciunas observed this fly feeding on hydrilla in India. A new request for entry of this fly into quarantine was approved in early 1985. Subsequent importation and successful host-specificity tests enabled this candidate to be released at Lake Patrick (also called Lake Lenore), Polk County, Florida, in October 1987 (Buckingham 1988). Adult females of this fly deposit one to several eggs upon suitable plant material (hydrilla). The larvae then bore into hydrilla leaves and may eat 9 to 12 leaves before pupating at the base of a leaf (Buckingham 1988). Leaves that have been attacked by larvae become transparent, and although all leaves in a whorl may be eaten, stems are not damaged. This fly has now established at many sites in Florida and other states (Center 1992). In Alabama and Louisiana, dramatic decreases in hydrilla abundance have occurred at sites where *H. pakistanae* had been recently released (Grodowitz and Snoddy 1992).

4 Australian Research Sites

Introduction

Although promising insects were already being evaluated in quarantine for their potential as biological control agents of hydrilla, it was felt that more insects would be needed to achieve the desired levels of control. With the foreign surveys completed in 1984, it was decided to set up an overseas laboratory to evaluate candidate insects in their native range. Potential hydrilla biocontrol agents were found in many countries, especially Australia, Burma, Sri Lanka, and Thailand (Balciunas 1985). Australia was chosen as the laboratory site due to year-round presence of hydrilla, availability of well equipped laboratories and qualified English-speaking staff (and taxonomists), and a stable political situation (Balciunas in press).

Australian Laboratories

Within Australia, a tropical site was selected to allow year-round collection of hydrilla. The city of Townsville was chosen, as laboratory space was available at the Commonwealth Scientific and Industrial Research Organization (CSIRO) Davies Laboratories. Collecting of insects from hydrilla and other aquatic plants began from there in January 1985. In mid-1985, a satellite facility with one full-time staff member was established at the CSIRO Long Pocket Laboratories in Brisbane, 1,100 km SSE of Townsville. This laboratory soon became the primary collection center for hydrilla stem boring (HSB) weevils, which were often abundant at several of the many reservoirs around Brisbane.

In May of 1987, lack of space at CSIRO's Davies laboratory in Townsville caused the hydrilla project to move into temporary facilities on the nearby campus of James Cook University of North Queensland (JCU). The laboratory was housed in the Fluids and Hydraulics laboratory in the Civil and Systems Engineering Building, while the office and some space in a shadehouse were located at the Biological Sciences building. The Townsville laboratory continued to operate out of the these "temporary" facilities for 3 years until July

1990, when we moved into our current, more spacious, and better equipped facilities in the Kevin Stark Research Building on the JCU campus.

Climatic Conditions

Unless otherwise stated, the following data on climate and population have been taken from various reports of the Australian Bureau of Statistics.

Queensland is a large, tropical and subtropical state that covers a latitudinal range from 10°S to 29°S. Annual rainfall varies widely within the state, from as little as 150 mm or less at many inland areas up to 4,000 mm at Tully and over 11,000 mm on Mount Bellenden-Ker (approximately 100 km south of Cairns).

Cyclones occur regularly in Queensland, particularly in the northern part of the state. From 1909 to 1987, 40 cyclones crossed the Queensland coast between Cooktown and Mackay (the coastal range of our northern Queensland (NQ) collection sites), while 16 crossed the coast between Maryborough and the New South Wales (NSW) border (most of the coastal range of our southern Queensland (SQ) sites). Several more cyclones usually come close enough to the coast each year to result in damage or side-effects of some kind. The heavy rainfall and flooding that occur with these cyclones usually flush all aquatic macrophytes in rivers and creeks downstream, thus disrupting our collecting at these sites until the plants have recolonized, which in some cases (e.g. Keelbottom Creek and Keelbottom Billabong) has taken more than a year.

When Cyclone Winifred crossed the coast south of Innisfail (210 km N of Townsville) in 1986, nearly 1 m of rain fell in Townsville, and the resultant floods caused the loss of nearly all aquatic macrophytes at our Townsville sites. For a short while, we had to travel to Mackay (approximately 350 km south by road) to obtain hydrilla for our laboratory colonies. Cyclones that crossed the coast near Ayr (70 km S of Townsville) in 1988 and 1989 had a lesser impact upon the project. The emphasis in 1988 was on aquatic moths, most of which were collected from the more northerly sites around Cairns which was not adversely affected by those cyclones. The hydrilla project was winding down in 1989 and most collections were from the more stable sites of Ross River Dam and Ross River where aquatic macrophytes survived the impacts of the 1988 and 1989 cyclones.

Floods were not the only environmental condition to restrict the availability of aquatic macrophytes. In July 1986, continuing drought in SQ forced us to send hydrilla from Townsville to Brisbane to maintain the insect colonies. Somerset Dam was one of the few SQ sites where hydrilla remained present during that time. In 1987, six years of drought in some parts of NQ resulted in the loss of some of our best sites. Despite rain from Cyclone Winifred the year before, drastic water restrictions were enforced in Townsville, as our most reliable collecting site, Ross River Dam, dropped to <10% of its water level. Also, for some months in 1987, our second most common collecting site,

Alice River, dried out completely. During this time, we had to collect at the more northerly sites between Cardwell and Cairns. The drought in Townsville was broken when Cyclones Charlie and Aivu crossed the Queensland coast less than 80 km south of Townsville in February of 1988 and 1989, respectively. Another cyclone at the beginning of 1991 lingered off the NQ coast for some time, resulting in record rainfall in Townsville. This same cyclone then moved south and caused extensive flooding in SQ. Ironically, in Townsville, these record rains were followed just a few months later by a near record number of days without rain.

These extreme environmental conditions obscured possible seasonal changes in the abundance of our candidate insects. As these climatic fluctuations are of an irregular occurrence, it is likely that these insects respond to factors other than seasonality (at least not directly).

Collecting Regions

Between January 1985 and December 1989, we regularly sampled hydrilla and other aquatic weeds in two main regions of eastern Australia: between the Daintree River (16°16′S) and Townsville (19°26′S), in north Queensland (NQ); and the coastal region from Gympie (26°20′S), southern Queensland (SQ), to Coffs Harbor (30°20′S), in northern New South Wales (NSW). We also occasionally sampled at sites new Darwin and Kakadu in the Northern Territory (NT); Mount Isa, Mackay, and Rockhampton in Queensland, and Sydney and Taree in NSW. From January 1990 until February 1992, occasional collecting continued, mainly to rear more Lepidopteran specimens, monitor populations of HSB and *H. balciunasi*; and provide shipment of these insects to quarantine and rearing facilities in the United States.

A map of Australia illustrating the main geographic centers for our collecting efforts is provided in Figure 1. The latitude and longitude of all collection sites, as well as the new weight of aquatic plant material collected from them, are given in Table 3 (NQ and NT sites) and Table 4 (SQ and NSW sites).

Collections were also made in early April 1986 in Sydney. Hydrilla was uncommon there, except in ornamental ponds. At a river in Penrith (near Sydney), Manning River, Taree, Macleay River, Kempsey, and the Clarence River at Grafton, hydrilla (if present) was found in small clumps on the edge of extensive *E. densa* beds. In contrast, hydrilla easily out-competes *E. densa* in Florida. We began regular collecting at aquatic sites in NSW in 1987.

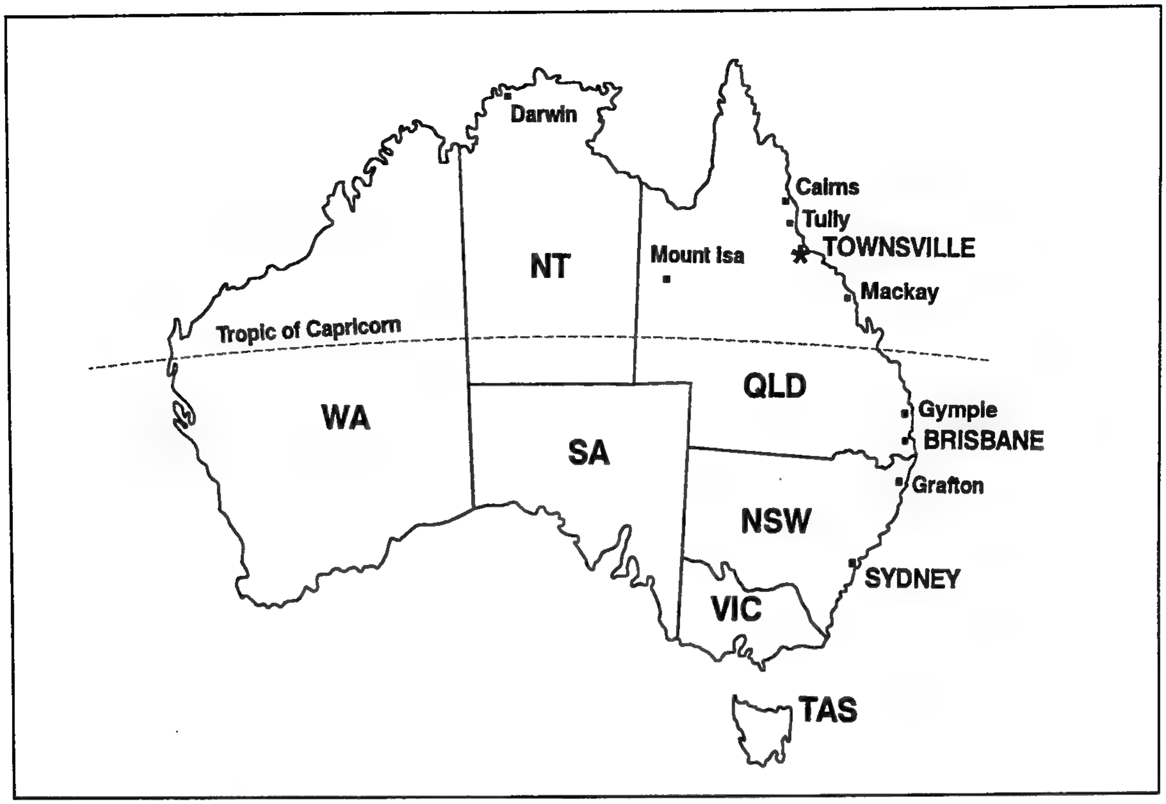

Figure 1. Map of Australia showing the locations of both ABCL laboratories and our major collecting regions

North Queensland Sites

We collected at 39 aquatic sites in NQ and 7 sites in NT (Table 3). Hydrilla was collected at 33 of these sites. Most of the sites were streams and rivers, although several reservoirs (dams) and ponds were also sampled. Our more important, regularly sampled sites are briefly discussed below. All distances shown are aerial map distances, *not* distances by road, which were usually considerably greater.

Townsville sites

Townsville (1990 population - 115,561) is the second largest city in Queensland and has a diverse economic base supported by defense forces, several scientific institutions, a major port, mineral refineries, cattle and agriculture, as well as tourism. Townsville has an average annual rainfall of 1,188 mm, but as the vast majority of this falls between December and April, the remaining 7 months are very dry, and many creeks and ponds dry out completely during this time each year.

Table 3
Location of Sites, Number of Berlese Collections, and Total Wet Weight of Plant Material Collected at North Queensland and Northern Territory Sites

Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
North Queensland Sites							
Alice River	19°19.1′	146°35.7′	60	1	95	156	120.4[1]
Apex Park	19°21.7′	146°43.9′	1	0	1	2	1.3
Avondale Creek	16°50.6′	145°41.5′	0	0	12	12	4.9
Barratt Creek	16°15.8′	145°20.2′	0	3	0	3	1.8
Barron River	17°09.9′	145°32.6′	2	0	0	2	1.4
Bohle River # 1	19°19.2′	146°42.2′	4	1	0	5	4.5
Bohle River # 2	19°17.5′	146°42.6′	19	0	11	30	30.4
Borrow Pits (#1,2)	19°14.6′	146°45.8′	30	0	30	60	59.3
Cattle Creek	18°44.1′	146°08.4′	5	0	37	42	20.3
Centenary Lakes	16°54.0′	145°44.8′	22	2	32	56	35.7
Clearwater Lagoon	20°36.5′	139°32.5′	2	0	2	4	3.1
Daintree River	16°14.3′	145°18.5′	2	1	1	4	1.8
Double Barrel Creek	18°07.8′	145°54.9′	0	9	0	9	6.7
Freshwater Creek	16°53.2′	145°42.1′	37	64	2	103	75.4[2]
Garbutt Park Stream	18°39.1′	146°09.4′	2	0	0	2	2.0
Goosepond Creek	21°07.4′	149°10.4′	4	0	7	11	10.3
Half Moon Bay Golf Course	16°48.5′	145°43.1′	0	0	1	1	0.4
Harvey Creek Overflow	17°15.6′	145°55.3′	0	26	22	48	28.9
Ingham Botanical Gardens	18°39.1′	146°09.3′	21	18	2	41	33.0

(Sheeet 1 of 3)

[1] Wet weight for 1 collection not recorded.
[2] Wet weight for 3 collections not recorded.
NR = not recorded.

Table 3 (Continued)

Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
Keelbottom Billabong	19°29.4′	146°20.2′	21	0	13	34	34.1
Keelbottom Creek	19°29.3′	146°20.1′	11	0	17	28	15.0
Lake Moondarra	20°36.4′	139°32.4′	2	0	0	2	2.9
Leichhardt Creek	19°07.6′	146°29.4′	1	2	6	9	3.5
Leichhardt River	20°43.1′	139°29.8′	0	0	1	1	0.7
Liverpool Creek	17°43.0′	146°02.6′	0	1	2	3	0.9
Louisa Creek	19°15.8′	146°45.0′	8	5	24	37	18.8
Martins Creek	16°14.3′	145°18.4′	2	2	1	5	3.7
Palm Creek	18°39.1′	146°10.1′	1	0	0	1	0.7
Palmetum Ponds	19°18.8′	146°45.9′	0	0	2	2	0.7
Quinns Pond	16°54.2′	145°44.5′	1	0	0	1	0.7
Rifle Creek Dam	20°57.4′	139°35.3′	0	1	0	1	NR[1]
Ross River	19°19.5′	146°43.6′	3	0	6	9	8.1
Ross River Bridge	19°18.5′	146°45.6′	6	1	17	24	17.8
Ross River Dam	19°26.0′	146°44.0′	53	23	120	196	130.6
Stone Creek	18°36.7′	146°03.2′	0	0	2	2	0.7
Stuart Creek	19°19.4′	146°50.2′	7	5	12	24	11.1
Tinaroo Dam	17°10.6′	145°33.2′	2	0	2	4	2.8
Upper Daintree River	16°13.4′	145°17.7′	1	0	0	1	0.7
Whitfield Creek	18°12.3′	145°57.1′	0	9	1	10	6.0

(Sheet 2 of 3)

Table 3 (Concluded)							
Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
Northern Territory Sites							
Borrow Pits - NT			0	0	1	1	0.4
Flying Fox Creek			0	0	1	1	0.4
Fogg Dam	12°34.0′	131°18.1′	4	0	4	8	2.9[1]
Georgetown Billabong	12°30.8′	132°55.8′	1	0	0	1	0.3
Holmes Jungle	12°25.8′	130°55.8′	2	1	0	3	1.4
Howard River	12°27.7′	131°04.9′	1	1	0	2	0.4[1]
Yellowater Billabong	12°53.5′	132°30.9′	3	1	5	9	2.4[2]
Number of Sites = 46			341	177	491	1009	708.1
							(Sheet 3 of 3)

Alice River. Site is 24 km WSW of Townsville, and 156 collections were made here: 60 Hyd, 26 Mar, 23 Cer, 19 Naj, 11 Ldpp, 7 Azo, 3 Cha, 3 Pol, 1 Blab, 1 Cpt, 1 Lem, and 1 Typ. This river is between 5 and 8 m wide and has high, steep banks, but the water is rarely more than 1 m deep. During 1985 - 1988 it would dry out completely toward the end of the year, but since 1989 it has generally flowed slowly all year round. The substrate is coarse river sand. After heavy wet-season rains, all plants were usually flushed downriver, with recolonization not recurring until several months later. Collecting at this site always occurred under or within 50 m of the bridge, 14 km along Hervey's Range Road at Rupertswood. This was our second most frequently visited collecting site in NQ and one of our first HSB sites. The hydrilla leaf-mining fly, *H. balciunasi*, was also consistently collected here.

Bohle River. Site is 14 km SW of Townsville. At Site 1, 5 collections were made: 4 Hyd, 1 Vl?sp. At Site 2, 30 collections were made: 19 Hyd and 11 Nygi. We had two collection sites on this river, the first was abandoned after the more productive second site was found in mid-1985. The second site is a more or less permanent pool, with a sandy bottom. The pool is 10 m wide and up to 1 1/2 m in depth. The highest densities of *H. balciunasi* were collected at this site, and collections from this site have supplied *H. balciunasi* for several shipments to Florida quarantine.

Table 4
Location of Sites, Number of Berlese Collections, and Total Wet Weight of Plant Material Collected at Southeast Queensland and New South Wales Sites

Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
South Queensland Sites							
Atkinsons Dam	27°25.3′	152°26.7′	10	2	1	13	16.3[1]
Brisbane River - College Crossing	27°33.5′	152°48.1′	0	1	0	1	1.9
Brisbane River - Fernvale	27°26.3′	152°38.3′	0	0	1	1	1.5
Canungra Creek	28°00.0′	153°09.5′	5	0	5	10	15.1
Coles Creek	26°21.6′	152°44.3′	2	0	0	2	3.4
Colleyville Floodway	27°48.7′	152°33.7′	1	0	0	1	1.5
Coonoon Creek	26°29.3′	152°42.3′	10	0	3	13	18.8
Currumbin Creek	28°13.4′	153°22.5′	6	0	0	6	9.1
Enoggera Creek - Ashgrove	27°26.5′	152°58.9′	0	25	0	25	35.3
Enoggera Reservoir	27°27.0′	152°54.5′	6	0	4	10	15.1
Enoggera - Breakfast Creek	27°26.6′	152°59.7′	0	9	0	9	11.5
Fairnie Creek	27°28.8′	152°40.0′	0	0	1	1	1.5
Four Mile Creek	27°17.9′	152°59.1′	1	0	1	2	1.5
Gold Creek	27°30.2′	152°54.8′	1	19	1	21	29.2
Gympie Lions Park	26°12.5′	152°40.5′	1	0	0	1	NR[1]

(Sheet 1 of 3)

[1] Wet weight for 1 collection not recorded.
[2] Wet weight for 3 collections not recorded.
NR = not recorded.

Table 4 (Continued)

Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
Hinze Dam	28°03.3′	153°17.1′	2	0	0	2	3.1
Hinze Dam Spillway	28°02.8′	153°16.8′	1	0	0	1	1.5
Horrigan Creek	23°42.5′	151°48.4′	1	0	0	1	NR[1]
Lake Borumba	26°30.6′	152°34.8′	31	16	38	85	109.2[1]
Maroon Dam	28°10.8′	152°38.8′	12	0	4	16	22.7
Mary River - North	26°20.0′	152°42.5′	4	0	0	4	4.7
Mary River - Conondale	26°43.9′	152°48.8′	22	12	5	39	55.8
Moogerah Dam	28°02.2′	152°33.4′	20	0	4	24	36.2
Normanby Gully	27°48.7′	152°39.5′	0	0	1	1	0.3
North Pine Dam	27°16.2′	152°56.4′	29	10	11	50	69.2
Ormiston Creek	27°29.4′	153°13.9′	0	3	0	3	3.5
Ormiston Park	27°30.7′	153°14.7′	0	22	1	23	30.7
Petrie Park	27°16.7′	152°58.8′	15	5	0	18	25.1
Queensland Agricultural College	27°33.0′	152°20.7′	6	0	2	8	10.6
Rafting Ground Road	27°30.3′	152°54.7′	0	1	0	1	1.4
Rocky Creek	27°32.2′	152°18.0′	1	0	0	1	NR[1]
St. Lucia Golf Club	27°30.3′	152°59.3′	1	0	0	1	1.5
Somerset Dam	27°06.4′	152°33.7′	23	14	6	43	62.9
Takilberan Creek	24°53.1′	151°44.8′	1	0	0	1	NR[1]

(Sheet 2 of 3)

Table 4 (Concluded)							
Site Name	Lat. South	Long. East	Hydrilla	Other Hydrocharitaceae	Non-Hydrocharitaceae	Number of Collections	Total Wet Weight (kg)
Wacol	27°34.7′	152°56.5′	0	0	1	1	1.5
Yabba Creek - North	26°25.4′	152°43.1′	1	1	1	3	4.4
Yabba Creek - Imbil	26°28.2′	152°38.7′	9	14	5	28	35.6
New South Wales Sites							
Alipou Creek	29°42.5′	152°57.0′	9	3	3	15	23.7
Byron Bay Golf Course	28°40.9′	153°36.5′	1	0	0	1	0.6
Carrs Creek	29°40.3′	152°55.1′	4	20	10	34	38.7[2]
Centennial Park	33°54.0′	151°14.3′	1	0	0	1	1.1
Fry Street	29°41.8′	152°56.6′	1	9	3	13	13.3[2]
Grafton Boat Club	29°41.8′	152°56.4′	3	25	1	29	41.6
Lismore Ski Lake	28°50.1′	153°15.9′	5	0	0	5	6.0[2]
Macleay River	31°04.9′	152°50.6′	1	2	0	3	2.6
Nepean River	33°44.7′	150°41.0′	0	1	0	1	0.8
Pine Creek	30°28.2′	153°04.7′	0	5	7	12	17.4
Royal Botanical Gardens - Sydney	33°51.8′	151°12.9′	1	0	0	1	1.0
Number of Sites = 48			248	219	120	585	788.5
							(Sheet 3 of 3)

Borrow Pits. Sixty collections were made here: 30 Hyd, 13 Ipo, 8 Ndin, 4 Elc, 2 Naj, 2 Nygi, and 1 Mar. This site adjoins the Town Common Environmental Park in Townsville. The Town Common itself is a freshwater and saline swamp that has gained international recognition among bird watchers for

the number and variety of birds it attracts. The Burrow Pits are two small ponds next to the boundary of the airport and contain numerous aquatic plant species.

Keelbottom Billabong. Site is 58 km SSW of Townsville; 34 collections were made: 21 Hyd, 4 Naj, 4 Ldpp, 2 Cha, 1 Ndin, 1 Nit, and 1 Scr. Billabong is an Australian term for the equivalent of an oxbow lake in the United States. Although essentially just an overflow of the adjacent Keelbottom Creek, this site contained more aquatic macrophytes than Keelbottom Creek, as they were less likely to be flushed downstream during wet-season floods. Unfortunately, for a good portion of the project, this billabong was dry. This was our best NQ site for collecting HSB, with 175 collected during one sample in December 1985, and a total of 512 HSB collected overall.

Keelbottom Creek. Site is 58 km SSW of Townsville; 29 collections were made: 11 Hyd, 9 Ptjv, 2 Cha, 2 Myvr, 2 Nit, 1 Cer, and 1 Utr. At an altitude of 310 m on Hervey's Range, this (along with Keelbottom Billabong) is one of the highest elevation sites in NQ. The mountain creek is wide (usually 15 m) but shallow (usually 1 to 1 1/2 m). Both Keelbottom sites have clear mountain water and coarse sand substrate, and collections were made regularly during 1985-1987. In 1988, when our research focused on moths, collections here were reduced as moths were less common at these sites. During much of 1989, all of 1990, and much of 1991, aquatic macrophytes were absent from these sites due to floods flushing the creek. Record rains in January/February 1991 resulted in this creek swelling to an estimated width of 90 m and a depth of 10 m. As is typical of this region, the waters quickly receded, and within 6 months, aquatic macrophytes had returned to Keelbottom Billabong and by the end of the year, to Keelbottom Creek.

Leichhardt Creek. Site is 37 km NW of Townsville; 9 collections were made here: 3 Myvr, and one each of Blab, Bloc, Cha, Hyd, Naj, and Vil. Collecting occurred at the bridge where the Bruce Highway crosses this creek, north of Townsville. The site is only 4 km upstream from the mangrove-lined estuary of the creek. The creek substrate consists of coarse sand.

Louisa Creek. Thirty-seven collections were made here: 8 Hyd, 6 Cer, 6 Pis, 5 Otov, 3 Mon, 3 Nygi, 3 Sal, 2 Mar, and 1 Azo. This small creek is only 2 to 3 km long and runs through a vacant industrial area of Townsville before ending in a small swamp. Collecting occurred where the creek crosses Ingham Road. Hydrilla at this site frequently appeared healthy but had heavy coverings of slime and algae, and as a result, numbers of insects extracted from this material were frequently limited.

Stuart Creek. Site is 7 km SSE of Townsville; 24 collections were made here: 7 Hyd, 5 Cer, 5 Otal, 3 Mar, 3 Pttr, and 1 Lem. We sampled at this site where the creek crosses the Bruce Highway on the southern approach to Townsville. Mangroves occur just 3 km downstream from the site, where the creek becomes saline. The creek is only 5 to 6 m wide, with steep-sided

banks and a mud substrate. Lilies (Ndin) were often present but were not collected from this site.

Ross River Sites

Ross River runs through the city of Townsville and contains our most readily available collecting sites. Due to the construction of a dam on this river at the outskirts of Townsville, and three weirs along the river below the dam, the water level in the river remains constant during droughts or floods, and can be considered to be a series of linear lakes. Most sections of the river were completely covered by *Salvinia molesta* in the early and mid-1980's, but releases of the weevil *Cyrtobagous salviniae* in 1984 (Forno 1987) quickly controlled this weed to such an extent that it is now extremely rare in this river.

Ross River Dam. Site is 18 km SSW of Townsville; 196 collections were made here: 53 Hyd, 31 Naj, 31 Ndin, 30 Cer, 23 Vl?sp, 17 Pttr, 5 Elc, 2 Azo, 2 Cha, 1 Ldpp, and 1 Utr. Construction of this reservoir was completed in 1976, and it covers an area as large as the city of Townsville itself. Its 9-km-long wall has angled sides and a road along its top, which allows access (with permission of local authorities) to numerous collecting sites along the wall. The dam is quite shallow, and its level has fluctuated almost 15 m over the past seven years. A variety of aquatic macrophytes were always present along the edge of the wall, allowing year-round collecting. In their 1978 survey, Finlayson and Gillies (1982) found 21 species of aquatic macrophytes present in this dam. With the continual presence of aquatic macrophytes, guaranteed all-weather access, short drive from JCU (21 km), and numerous insect herbivores present (HSB, *H. balciunasi*, Pyralidae; for more information, see following sections), this was our best NQ collection site.

Ross River - Apex Park. Two collections were made here: 1 Hyd and 1 Naj. Collections began here in 1990. It is a commonly used public recreational park on the western banks of the Ross River, only 5 km downstream from the Ross River Dam. Hydrilla, Naj, and Cer were always intermingled along the river's edge, on the park side of the river. The other side of the river was dominated by lilies, floating islands of sedges, and mixed emergent vegetation. *Hydrellia balciunasi* was collected at this site.

Ross River (Gregory Street). Nine collections were made here: 3 Hyd, 2 Ndin, 2 Nygi, 1 Naj, and 1 Pttr. This site is commonly used for swimming and water skiing. Hydrilla was found on both sides of the river, while the lilies (Ndin, Nygi) were found only on the east side of the river, among the many reeds. The hydrilla on the west side of the river occurred in small patches in shallow water against the river bank, while on the east side of the river, it was found in large quantities among lilies, in water several meters deep. *Hydrellia balciunasi* has been found at this site.

Ross River - Charles N. Barton Bridge. At this site 24 collections were made: 6 Hyd, 6 Ndin, 5 Cer, 3 Pttr, 2 Naj, 1 Elc, and 1 Vl?sp. This bridge is

located only several kilometers from JCU and CSIRO Davies Laboratory. It is one of only three bridges on the Ross River; the other two are below the last weir where the water regularly becomes saline. This site is occasionally used by swimmers and rowers. Aquatic macrophytes are generally confined to the river's edge, although lilies (Ndin, Nygi) are present midstream. All collections at this site were made on the north side of the river where aquatic plants were easily accessed.

Ingham/Tully sites

Ingham is 90 km NW of Townsville, and Tully is a further 80 km N of Ingham. Apart from the Botanical Gardens and Garbutt Park Stream (2 Hyd collections only), most collection sites were where creeks crossed the Bruce Highway (which connects Townsville to Cairns).

Double Barrel Creek. Site is 22 km S of Tully; 9 collections of Bloc were made here. Sampling occurred under the bridge where the creek crosses the Bruce Highway.

Cattle Creek. Site is 9 km S of Ingham; 42 collections were made here: 12 Cer, 10 Utr, 5 Hyd, 4 Eic, 4 Ndin, 4 Nygi, 2 Mar, and 1 Naj. Collecting occurred where the creek crosses the Bruce Highway. The *Utricularia* sp. at this site was frequently infested with a new species of *Bagous* weevil which we referred to as the *Utricularia* weevil, but which has now been formally described as *B. utriculariae* O'Brien (O'Brien and Askevold 1992).

Ingham Botanical Gardens. At this site 41 collections were made: 21 Hyd, 18 Vl?sp, 1 Ndin, and 1 Nygi. The artificial ponds contained numerous species of aquatic macrophytes. HSB and *H. balciunasi* were both collected from this site.

Whitfield Creek. Site is 10 km NW Cardwell, 60 km N of Ingham; 10 collections were made here: 9 Bloc, and 1 Phl. We collected at the bridge over this creek on the Bruce Highway, 1/2 km north of the township of Kennedy. At this site, *Blyxa octandra* was frequently infested with a new species of *Bagous* weevil which we referred to as the *Blyxa* weevil, but which has now been formally described as *B. blyxae* O'Brien (O'Brien and Askevold 1992).

Cairns sites

Cairns (1990 population 84,772) has an economy which is highly dependent upon tourists who come to visit the Great Barrier Reef and the World-Heritage-listed tropical rainforests. Nestled between the base of rainforest-covered mountains and extensive mangrove systems on the coast, Cairns has an average annual rainfall of 2,032 mm, and the 1988-89 average minimum and maximum temperatures were 20.8 °C and 29.6 °C, respectively. Many of

the creeks sampled around Cairns were cool and clear, flowing down from the nearby mountains.

Avondale Creek. Twelve collections were made here: 5 Cab, 4 Mon, 2 Ldhs, and 1 Mar. This site is at Smithfield, beside the Cook Highway, 12 km NW of the Cairns central business district (CBD). It was the only NQ collection site for Cab and Mon. In 1988, this part of Avondale Creek was replaced by a concrete culvert, destroying the habitat for aquatic plants.

Barron River. Site is 38 km SW of Cairns; 2 Hyd collections were made here. This large river flows from the Atherton Tablelands, through rainforest, and ends in a large mangrove estuary just north of Cairns. It supports several large waterfalls and a hydroelectric power station. The two collections from this river were made just below Tinaroo Dam, not far from the town of Atherton.

Barron River-Tinaroo Dam. Site is 38 km SW of Cairns; 4 collections were made here: 2 Hyd, 1 Apo, and 1 Pttr. We found submersed macrophytes in this large reservoir only during the record-breaking drought of the late 1980's, when water levels had receded some 10 m.

Centenary Lake. At this site, which is 4 km NW of Cairns, 56 collections were made: 23 Cer, 22 Hyd, 5 Utr, 2 Ndin, 2 Vl?sp, 1 Azo, and 1 Nygi. This ornamental pond forms a boundary for the Cairns Botanical Gardens and was often "choked" with aquatic vegetation. While hydrilla was usually present, surprisingly, HSB was never collected here.

Freshwater Creek. At Freshwater Creek 103 collections were made: 40 Vl?sp, 37 Hyd, 24 Bloc, 1 Cyp, and 1 Lem. This site is located 8-1/2 km NW of the Cairns CBD. This clear water creek flows down from rainforest-covered mountains into the Barron River. Collecting occurred in the suburb of Redlynch, just upstream of the popular Freshwater Park swimming hole. This was our best site for collecting the three stream-dwelling aquatic moth species that we studied. Unfortunately, hydrilla declined to very low levels at this site in 1988, possibly due to the introduction of an exotic snail.

Harvey Creek Overflow. Site is 41 km SSW of Cairns; 48 collections were made: 26 Bloc, 20 Mytr, and 2 Ptjv. This tiny tributary of Harvey Creek is usually only several meters wide, but has a reliable flow. The vegetation was confined to small pools or behind larger rocks. The majority of collections were made under the Bruce Highway bridge in 0.1 to 0.3 m of water.

Daintree sites

We first collected in the Daintree vicinity in April 1988, and all collections were made near the village of Daintree (85 km north of Cairns), either from the Daintree River itself, or from creeks that flow into this river. This broad, shallow river runs through pasture and remnant stands of rainforest, and ends

in an extensive mangrove forest. This river is famous for its crocodiles, and a fatal attack took place here in 1987.

Daintree River. Site is 25 km NNW of Mossman; 4 collections were made: 2 Hyd, 1 Naj, and 1 Vlgi.

Upper Daintree River. Site is 28 km NNW of Mossman; 1 Hyd collection was made.

Barratt Creek. Site is 22 km NNW of Mossman; 3 collections were made: 2 Bloc and 1 Vlgi.

Martins Creek. Site is 25 km NNW of Mossman; 5 collections were made: 2 Hyd, 1 Bloc, 1 Naj, and 1 Vlgi.

Mount Isa sites

Mount Isa (1990 population 23,882) is an isolated, inland mining city, some 780 km west of Townsville. This city is surrounded by arid country for several hundred kilometers on all sides. As is typical of inland Australia, it is very arid, and temperature fluctuations are greater than in coastal areas. The 1986/87 mean minimum and maximum temperatures for Mount Isa were 18.2 °C and 32.9 °C, respectively. Despite a low average annual rainfall of 456 mm, there are four more or less permanent water bodies which were sampled. The two sites not listed are Rifle Creek Dam (1 Hyd collection below the spillway) and Lake Mary Kathleen (2 manually sorted Hyd samples only).

Clearwater Lagoon. Site is 15 km NNE of Mount Isa; 3 collections were made here: 1 Hyd, 1 Myvr, and 1 Pttr. This site is actually part of Lake Moondarra, but is separated from it by a wall. This lagoon is elevated some 10 m above Lake Moondarra, and while the water levels fluctuate greatly in the lake, they remain constant in the lagoon. Thus, due to the vastly different conditions in the lagoon, we consider it to be a separate site from the lake.

Lake Moondarra. Site is 15 km NNE of Mount Isa; 2 Hyd collections were made here. Lake Moondarra is a man-made reservoir constructed on the Leichhardt River, and during the dry season, all areas <2 m deep are occupied by dense monotypic stands of hydrilla. In the wet season, when water levels can rise by up to 5 m, hydrilla is hard to find. That hydrilla thrives, despite the tremendous variations in water level, has implications for the use of drawdowns as a means of controlling aquatic macrophytes in the United States. This reservoir had the worst infestation of *S. molesta* in Australia during the late 1970's, with up to 50,000 tons of fresh weight covering 400 ha (Room et al. 1981). Releases in June 1980 of 1,500 *C. salviniae* weevils rapidly and effectively controlled this problem weed. Within 11 months, the population of weevils was estimated at 6 million, and 99 percent of buds were damaged (Room et al. 1981). Within 14 months, less than 1 ton of *S. molesta* remained.

HSB was collected here, despite this site being located hundreds of kilometers from our other aquatic sites.

Mackay sites

Mackay (1990 population 52,234) services a major sugar cane growing district, and many of the creeks in this area may have elevated levels of phosphorous and nitrogen from farm runoff. We only collected in this area when hydrilla was scarce at most other coastal NQ sites. Although a similar distance from Townsville as Cairns, Mackay was not a regular sampling area, as hydrilla was rarely present at creeks between these two cities.

Goosepond Creek. Eleven collections were made here: 5 Cer, 4 Hyd, 1 Naj, and 1 Ptcr. This small, 6-km-long creek runs through the city of Mackay and empties into the Pioneer River estuary. Our collections were on a wide portion of this creek, surrounded by parkland.

Northern Territory Sites

Darwin (1990 population 64,200) is the capital, as well as the major administrative and economic support base, of the Northern Territory. The Southeast Asian monsoons pass over Darwin every year, resulting in very heavy rains in summer. Like Townsville, much of the rest of the year is dry. A very real danger in collecting at these sites is estuarine crocodiles. Although most common in estuaries, these crocodiles are also found in freshwater systems hundreds of kilometers inland.

Fogg Dam

This site is 55 km ESE of Darwin; 8 collections were made here: 4 Hyd, 1 Cer, 1 Nel, 1 Ndin, and 1 Pis. Fogg Dam is a shallow reservoir, completely "choked" by a large variety of aquatic plants. Thousands of weevils were attracted to blacklights when used at this site.

Yellowater Billabong

Nine collections were made at this site: 3 Hyd, 2 Nygi, 1 Cer, 1 Naj, 1 Ndin, and 1 Vlsp. In early October 1982, the senior author (J.K. Balciunas) collected hundreds of HSB at a blacklight here. This collection heavily influenced the decision to establish a biocontrol laboratory in Australia.

South Queensland Sites

A satellite laboratory was established in Brisbane in 1985 at the CSIRO Long Pocket Laboratories. Brisbane is the capitol and largest city of Queensland (June 1989 population 1,272,378). It has a temperate climate, and the average annual rainfall is 1,152 mm, most of which usually falls during the summer period.

Field collections were made at sites within a 200-km radius of Brisbane in SQ, and also in northern NSW near Grafton and Lismore. Hydrilla and other aquatic weeds were collected from 48 sites in these areas (Table 4), 36 of which were hydrilla sites. These sites were located in a number of different aquatic habitats, including man-made dams, small to large rivers, creeks, small ponds, drainage ditches, and a small lake.

Atkinsons Dam

Dam is 57 km W of Brisbane and 13 collections were made here: 10 Hyd, 1 Otov, 1 Ptoc, and 1 Vlgi. Atkinsons Dam (567 ha) supplies the Lockyer Valley with irrigation. It has a wide sandy shoreline, and frequently a band of aquatic weeds grows around its perimeter. Most samples were made near the boat ramp on the northern side of the dam. During a drought in late 1986, and throughout 1987, the dam completely dried out. Few collections were made at this site after 1987. This site was one of our most popular initially, and it is where we first collected HSB in SQ. Some *H. balciunasi* were collected from this dam.

Canungra Creek

The site is 62.5 km SSE of Brisbane and 10 collections were made here: 5 Hyd, 3 Ptpr, and 2 Ptcr. The creek is 5 to 10 m wide, usually up to 1.5 m deep, with steep banks. The substrate consists of clay and river rock. The creek is regularly flushed during high rainfall. Hydrilla and *P. crispus* were collected from the slow flowing area of the stream, while *P. perfoliatus* was collected in the faster flowing portions. All collections were made on the eastern side of the Canungra-Beenleigh Road bridge. This creek was important for collecting *H. balciunasi*. *Hydrellia* sp. larvae, belonging to another, larger species, were also collected from *P. perfoliatus*.

Coonoon Creek

Site is 110 km NNW of Brisbane; 13 collections were taken here: 10 Hyd and 3 Ptcr. The creek is mostly 2 to 3 m wide. However, all samples were taken from a pool, 5 m wide and up to 1.5 m deep, next to the Kenilworth-Gympie Road bridge. The pool is surrounded by steep banks, and the

substrate is mostly clay. This creek contained high quality, thick-stemmed hydrilla, which was frequently used for HSB laboratory colonies. Large numbers of *H. balciunasi* and moderate numbers of *Parapoynx* spp. were collected from this site.

Currumbin Creek

Site is 92 km SSE of Brisbane and 6 Hyd collections were made here. The creek is 3 to 4 m wide, with a steep bank on one side and open pasture on the other. The depth ranges from very shallow in the fast-flowing sections to 1.5 m in the deeper pools. All collections were taken next to the Currumbin Creek Road bridge. It was one of the few SQ sites where hydrilla was collected from fast-flowing water. Numerous *H. balciunasi* were collected from this creek.

Enoggera Creek (2 Sites)

Site is 3.5 to 5 km NW of Brisbane city center and 34 Egr collections were taken. The creek is shallow, up to 0.5 m deep, only 2 to 10 m wide, with steep banks, and a sand/clay substrate. The collections were made at two sites at Ashgrove, next to the Mirabooka Street bridge, and beside a small foot bridge located on Park Road. These two sites were our major collection sites for *E. densa* in Brisbane. Few other aquatic plant species were present. The sites were flushed regularly, which temporarily removed all *E. densa*.

Enoggera Reservoir

Reservoir is 11.5 km W of Brisbane city center and 10 collections were taken: 6 Hyd, 2 Nymx, 1 Cer, and 1 Nygi. All collections were made at the shallower (approx 1.5 to 2.0 m), southern end of this reservoir, where hydrilla, *C. demersum*, and water lilies became quite thick. Collections ceased at this site after April 1986. The reservoir was our only dam site within the city of Brisbane. Access for collection was by boat only. *Hydrellia balciunasi* were collected in moderate numbers from hydrilla at this site.

Gold Creek

Site is 12 km SW of Brisbane city center and 21 collections were made here: 15 Egr, 4 Vl?sp, 1 Hyd, and 1 Ptcr. The creek is 2 to 7 m wide and up to 1 m deep. A small bank lines both sides of the creek, and the substrate is river rock and clay. All samples were made next to where Rafting Ground Road crossed the creek, on both sides of the road. This site had low numbers of *H. balciunasi* and *Parapoynx* spp. *Egeria densa* grew mostly below *Nymphaea* species in the slow-flowing sections of this creek. Hydrilla was

sampled only once, downstream from the *E. densa*, on the opposite side of the road.

Lake Borumba

Site is 113 km NNW of Brisbane and 85 collections were made here: 31 Hyd, 16 Vl?sp, 12 Naj, 11 Ndin, 7 Pttr, 4 Myvr, 2 Ptcr, 1 Ptpr, and 1 *Ludwigia* species. Lake Borumba is a reservoir about 400 m wide, with a 10- to 20-m band of aquatic weeds growing in front of a public picnic area on the eastern side. Hydrilla and *V. ? spiralis* frequently grow at the water's edge, topping out at the shoreline. Water depth progressively increases from the shoreline, except at the southern end, where it drops to 2 m only 2 to 3 m from shore. The substrate consists of a sand/clay mix. Collections were made on both sides of the boat ramp.

This dam was probably the most important collection site for the Brisbane laboratory. More collections were made at this site than at any other in SQ/NSW. The presence of a wide variety of aquatic plants helped us in establishing the field host-specificity of possible biological control agents, especially HSB. Large numbers of HSB were collected here, as were moderate numbers of *H. balciunasi* and *Parapoynx* spp.

Maroon Dam

Dam is 89 km SW of Brisbane and 16 collections were taken here: 12 Hyd, 3 Ptcr, and 1 Azo. Water depth progressively increases from the shore, and the substrate is mainly clay. The dam is surrounded by hills with moderate inclines, and aquatic plants usually grow in a 5- to 10-m band around the shore. All collections were made at the boat ramp on the northwestern side of the dam. Large numbers of *Parapoynx* spp. larvae were collected from this small (326 ha) irrigation dam. These larvae were collected from both hydrilla and *P. crispus*. High numbers of HSB were collected from hydrilla, especially in stranded material.

Mary River North

Site is 129 km NNW of Brisbane and 4 Hyd collections were made. Hydrilla grows along the eastern side of the river, next to a steep 1-m-high bank. The river is approximately 25 m wide and up to 2 m deep. All samples were made on the southern side of the bridge. This site was one of only two flowing creek sites in SQ from which HSB was collected. *Hydrellia balciunasi* and a few *Parapoynx* spp. were also collected here. The Mary River is renowned for its capacity to rise quickly after rain, and this site was flushed on several occasions.

Mary River - Conondale

Site is 85 km NNW of Brisbane and 39 collections were taken here: 22 Hyd, 12 Vl?sp, 1 Cab, 1 Ldpp, 1 Myvr, 1 Ndin, and 1 Ptpr. At Conondale, this river is 25 m wide and the substrate largely consists of sand and river rock. The depth varies from 0.5 m to 2 m. *Vallisneria ?spiralis* grows extensively on a shallow bank on the southern side of the river, while most of the hydrilla grows midstream. Steep, 2-m-high banks line the river on both sides. All collections were made below, or on the western side, of the Conondale-Kenilworth Road bridge. This was our second site on the Mary River. A single HSB was collected here, as well as moderate numbers of *H. balciunasi* and *Parapoynx* spp. larvae.

Moogerah Dam

Site is 82 km SW of Brisbane and 24 collections were made here: 20 Hyd, 2 Ptcr, 1 Azo, and 1 Naj. This irrigation dam is 878 ha in size, with mostly wide, flat, sandy shorelines. A band of aquatic plants (5- to 10-m wide) is usually present around the perimeter. Most of the collections were made from the eastern shore, next to the boat ramp, in front of the caravan park. This was one of our best sites for collecting HSB weevils, and was the site where HSB pupae were first found in the field, on hydrilla which was stranded and buried on the shore. A pupation study of HSB was conducted at this dam (Balciunas and Purcell 1991).

North Pine Dam

Dam is 21.5 km NW of Brisbane and 50 collections were taken at this site: 29 Hyd, 7 Vl?sp, 6 Ndin, 3 Vlgi, 3 Ptpr, and 2 Ptcr. The dam has wide sandy shorelines, with a 5- to 10-m-wide band of aquatic weeds growing around its perimeter. The dam is surrounded by a gentle to moderately sloped incline. Large fluctuations in the water level were observed during the project's duration. Most collections were made on the eastern side of the dam near the boat ramp, and in front of the public picnic area. This is the closest site to Brisbane where large numbers of both HSB weevils and *H. balciunasi* were reliably collected. HSB were collected in high numbers from hydrilla and *V. ?spiralis* stranded on the shore. Several of our overseas shipments of hydrilla insects were collected from this site.

Ormiston Park

Park is 22.5 km E of Brisbane and 23 collections were taken: 21 Egr, 1 Nymx, and 1 Otov. *Egeria densa* was the most abundant submersed plant at this site, where it usually grew beneath *N. mexicana*. No hydrilla was collected. The creek was regularly flushed, which usually removed all of the *E. densa*. The water depth drops sharply to 1.5 m to 2.0 m directly in front of

the 0.5-m steep bank. The substrate was sand/clay. All collections were made on the eastern side of the creek. The site was located on Hillards Creek, and was our most coastal collection site in SQ.

Petrie Park

Park is 19.5 km NW of Brisbane and 18 collections were made: 13 Hyd and 5 Otov. This pond site was 15 m wide and relatively shallow (up to 1 m), but with a deep muddy substrate, which restricted wading. Hydrilla could be reliably collected here, even after heavy rain, as it was rarely flushed. Large numbers of *H. balciunasi* were collected here, some of which were shipped to quarantine facilities in Gainesville, FL.

Queensland Agricultural College

Site is 70.5 km WSW of Brisbane and 8 collections were taken: 6 Hyd, 1 Lud, and 1 Nygi. Collections at this site were made in a 20-m-wide pond that usually contained hydrilla. The substrate consists of mud and sand, and the water reaches a maximum depth of 1.5 m. The pond is surrounded by a flat, open grassed area, near the college car park. This was our most westerly SQ site, and collections were made here in 1985 and 1986 only. High numbers of *H. balciunasi* were present on hydrilla.

Somerset Dam

Dam is 60.5 km NW of Brisbane and 43 collections were taken: 23 Hyd, 14 Vl?sp, 3 Cer, 2 Naj, and 1 Lud. Like most of the dams in SQ, the perimeter usually has a 5- to 10-m band of aquatic weeds. The plants are easily collected by wading, as the water depth rarely exceeds 1.5 m in these areas. The wide sandy shoreline gently slopes into the water. All of the collections were made on the western side of the dam, at a picnic area known as "the spit." This site was one of our top two sites for collecting both HSB and *H. balciunasi*, many of which were shipped to quarantine facilities in Gainesville, FL. HSB weevils were reliably collected from the stranded hydrilla along the shoreline.

Yabba Creek - Imbil

Site is 31 km SW of Gympie and 28 collections were made: 14 Vl?sp, 9 Hyd, 4 Ptpr, and 1 Ptcr. All collections were made on the northern side of the Imbil-Lake Borumba Road bridge. This was one of the few fast-flowing creek sites where HSB were collected. These weevils were collected on *V. ?spiralis*, which grew close to the small, steep banks of the creek. Hydrilla grew in a deeper pool (approx 2 m) beside the main flow.

New South Wales Sites

Alipou Creek

Site is 2 km SE of Grafton and 15 collections were taken: 9 Hyd, 3 Ptoc, and 3 Vl?sp. This creek is only 2 to 3 m wide, with 2- to 3-m steep banks and is regularly flushed, usually removing all the hydrilla. *Vallisneria ?spiralis* grows along the perimeter of the creek, while hydrilla grows toward the center. All collections were made on the southern side, where the National Highway crosses the creek. This site, and others in NSW, were sampled regularly from 1987 onward. This was our main hydrilla site in NSW. Both HSB and *H. balciunasi* were collected from this creek. This site was important because it was the only location where substantial numbers of HSB were located near *E. densa*, a laboratory host of HSB.

Carrs Creek

Site is 3 km W of Grafton and 34 collections were taken: 19 Egr, 4 Hyd, 4 Naj, 2 Cer, 2 Ptpr, 1 Azo, 1 Unknown, and 1 Vl?sp. The creek is 30 to 40 m wide and usually full of aquatic weeds, except after occasional flushing. Most collections were made using a rake on a rope from a bridge which crossed the creek, or from the shore, as the water depth in places was over 2 m. This was our best NSW site for collecting a variety of aquatic plants.

Clarence River (2 Sites)

Sites are 1 km SE of Grafton and 42 collections were taken: 28 Egr, 6 Vl?sp, 4 Hyd, 2 Cer, 1 Ndin, and 1 Ptcr. The river itself is about 300 m wide, with little or no obvious flow along its perimeter. All collections were made directly in front of the Grafton Boat Club or from the Fry Street boat ramp. These sites were important because they were similar in appearance to the dam sites in SQ, where high populations of HSB occurred. These sites had wide, flat, sandy shorelines, with a 5- to 20-m band of aquatic weeds just offshore, growing in a maximum depth of 1 to 2 m. However, unlike the sites in SQ, most of this aquatic vegetation was *E. densa*, not hydrilla. Both sites were close to Alipou Creek, where HSB were found in hydrilla, yet only two HSB weevils were collected from *E. densa*.

Lismore Ski Lake

Site is 3 km SSW of Lismore, 102 km NNE of Grafton and 5 Hyd collections were made here. The lake is only 70 m across, with patches of hydrilla growing around its perimeter. The water depth drops off steeply from the shore. All collections were made near the boat ramp, on the western side of the lake. This was one of only two sites in NSW that had substantial

numbers of HSB weevils. Most of these were collected from stranded plant fragments on the shore.

Pine Creek

Site is 15 km SW of Coffs Harbour, 85 km SSE of Grafton and 9 collections were made: 5 Tri, 3 Otov, 2 Eld, 1 Cab, and 1 Ndin. The creek was small (1 to 4 m wide) and fast-flowing, with a sand/mud substrate. The creek was in a deep gully, and access was extremely difficult. All collections were made on both sides of the National Highway bridge. This was our southernmost routine collection site. It was also the only site where we collected *E. canadensis* (small amount) and *T. procera.*

5 General Collecting, Processing, and Rearing

Field Collections

Aquatic plants were usually collected by hand while wading. At inaccessible locations, a rake head attached to a rope was used. In deeper water, a surf ski or a rented boat was used to reach the hydrilla. The samples were briefly drained of water, then placed into labeled plastic bags for transportation to the laboratory, inside an insulated container. The following environmental data were recorded in the field collection sheets: water pH, water temperature, water depth, other plant species present, and their relative abundance, weather, habitat characteristics, and notes on plant populations and growth. An example of a field collection sheet is provided in Appendix B. A printout of the databases for NQ/NT and SQ/NSW is provided in Appendixes J and K, respectively. These Appendixes provide information on collection data, site, and the plant species collected, as well as the wet weight of plant material and the numbers of HSB weevils and *Hydrellia balciunasi* flies found in each collection.

Berlese Processing

A total of 1,009 berlese samples were processed by the Townsville laboratory, while the Brisbane laboratory processed 586 berlese samples. Due to the larger berleses used by the Brisbane laboratory, the total wet weight of plant material processed there was greater (788 kg vs 708 kg). The number of collections made in each collecting region, and by each laboratory, for each year of the project, is presented in Table 5.

At the Townsville laboratory, 20-cm-diameter berleses were used. Typically, 350 g (wet weight) of plant material was placed into each berlese (though this often varied). Between 1 and 8 berleses (each with a single 25-W bulb) were set up for each collection, depending on the amount of material collected (3 berleses, approximately 1.050 kg was the most common setup). Samples were dried slowly over 4 to 6 days. Their dry weights were recorded

Table 5
Number of Berlese Collections Processed at Each Laboratory in Each Year

	1985	1986	1987	1988	1989	1990	1991	1992	Total
Townsville Laboratory									
North Queensland									
Hydrilla verticillata	100	102	55	32	14	19	4	4	330
Other Hydrocharitaceae	16	55	55	34	12				175
Non-Hydrocharitaceae	109	208	90	44	11	20			479
Subtotal	225	365	200	110	37	39	4	4	984
Northern Territory									
Hydrilla verticillata	8	3							11
Other hydrocharitaceae	1	2							3
Non-Hydrocharitaceae	5	6							11
Subtotal	14	11							25
Townsville Lab Total	239	376	200	110	37	39	4	4	1,009
Brisbane Laboratory									
South Queensland									
Hydrilla verticillata	48	60	59	31	20	3			221
Other Hydrocharitaceae		76	45	28	5				154
Non-Hydrocharitaceae	13	26	37	15	3	2			96
Subtotal	61	162	141	74	28	5			471
New South Wales									
Hydrilla verticillata		5	7	6	6	2			26
Other Hydrocharitaceae		6	28	21	9	1			65
Non-Hydrocharitaceae		1	14	6	2	1			24
Subtotal		12	49	33	17	4			115
Brisbane Lab Total	61	174	190	107	45	9			586
Total for Both Labs	300	550	390	217	82	48	4	4	1,595

on the seventh day, and a small portion of plant material from each berlese was saved for later identification if necessary.

In the Brisbane laboratory, 50-cm-diam berlese funnels were used. Up to 3 kg of aquatic plant material could be processed in one funnel; however, usually 1 to 1.5 kg was added to each funnel (1 sometimes 2 funnels/

collection). Two to four 25-W bulbs (occasionally two 40-W bulbs) were used to dry the material, depending on the amount and type of plant material. Bulbs of higher wattage were sometimes used when large quantities of plant material were processed to collect adult HSB weevils.

A total of 1,595 berlese sorted and 129 manually sorted samples were processed during this project. Of these, 588 berlese and 97 manual samples were of hydrilla. The remaining 1,007 berlese and 32 manual samples were of 47 aquatic plant species from 27 families. A listing of all plant species collected, the families they belong to, and the number of collections made from them in each of the four main collecting regions is presented in Table 6. The number of sites that each plant species was collected from by the Townsville and Brisbane laboratories and their total wet weight are shown in Table 7.

Manual Processing

During the early part of the project, a portion of each sample was examined using a dissecting microscope (manual samples), and the remainder was processed in berlese extraction funnels. Berlese extraction was found to be the easiest and most efficient method of collecting internal-feeding herbivores and was the only method used after 1986. Before being put into berleses, plant material was hand-sorted to ensure that berlese samples would not be contaminated by portions of other plant species.

The Townsville laboratory processed 24 manual samples and the Brisbane laboratory processed 117 manual samples. However, these samples yielded very few insects when compared with berlese sorted samples, and were abandoned within 12 months.

Blacklight Collections

Collections of insects from plant material were supplemented by blacklight collections. These were performed by suspending a white bedsheet near a water body containing hydrilla. A 15-W ultraviolet (blacklight) fluorescent tube was placed in front of the sheet. The light was powered by a motorcycle battery, or from a nearby vehicle via its cigarette lighter outlet. Usually the light was turned on 1/2 hr before sunset, and (if collecting proved successful) turned off 1-1½ hr later, when relatively few additional insects were being attracted. Blacklight collecting was ineffective if the moon was visible at dusk, and was therefore restricted to half of the lunar cycle. Within this 2-week period, many nights were unsuitable due to wind or precipitation.

Since no host information could be gained from herbivores collected at a blacklight, we used blacklights primarily to collect large quantities of a particular insect species, or to detect their presence at a particular site. The principal targets of our blacklight collections were adults of the aquatic weevils and

Table 6
Number of Berlese Collections from Different Aquatic Plant Species at Our Four Main Sampling Regions

Plant Species	QLD	NT	SQ	NSW	Total
Hydrocharitaceae					
Blyxa aubertii	2				2
Blyxa octandra	73				73
Egeria densa			71	50	121
Elodea canadensis				2	2
Hydrilla verticillata	330	11	221	26	588
Ottelia alismoides	5				5
Ottelia ovalifolia	5		10	3	18
Vallisneria gigantea			4		4
Vallisneria spiralis	3	3			6
Vallisneria ?spiralis (narrow-leaved)	86		69	10	165
Non-Hydrocharitaceae					
Aponogeton sp.	1				1
Azolla ?pinnata	11		2	1	14
Cabomba caroliniana	5		2	1	8
Ceratophyllum demersum	110	2	4	4	120
Ceratopteris sp.	1				1
Chara sp.	10				10
Cyperus sp.	1				1
Eichhornia crassipes	10		1		11
Eleocharis sp.	4				4
Ipomoea aquatica	13				13
Leersia sp.	1				1
Lemna sp.	2				2
Ludwigia hyssopifolia	2				2
Ludwigia peploides	16		4		20
Marsilea ?drummondii	34	1	1		36
Monochoria cyanea	7				7
Myriophyllum trachycarpum	20				20
Myriophyllum verrucosum	7	1	5		13

(Continued)

Table 6 (Concluded)					
Najas tenuifolia	67	1	15	4	87
Nelumbo ?nucifera		1			1
Nitella sp.	3				3
Nymphaea gigantea	26	2	2		30
Nymphaea mexicana			3		3
Nymphoides indica	55	2	18	2	77
Philydrum lanuginosum	1				1
Pistia stratiotes	6	1			7
Polygonum ?decipiens	3				3
Potamogeton crispus	1		16	1	18
Potamogeton javanicus	13				13
Potamogeton ochreatus			1	3	4
Potamogeton ?pectinatus			1		1
Potamogeton perfoliatus			13	2	15
Potamogeton tricarinatus	27		7		34
Salvinia molesta	3		1		4
Scirpus sp.	1				1
Triglochin procera				5	5
Typha sp.	1				1
Utricularia sp.	17				17
Villarsia reniformis	1				1
Total	984	25	471	114	1,596

moths. Both groups were sometimes abundant at blacklights, and the different species could usually be distinguished while we were collecting them.

Preservation, Rearing, and Identification

All non-herbivorous insects and all non-insects collected were immediately preserved. Herbivorous insects were either reared (if larvae), put into laboratory colonies, or preserved. Larvae were reared individually in small 300-ml plastic containers. Laboratory colonies were maintained in aquaria or in plastic containers. For preservation, adults were generally pinned or placed in vials containing 70% alcohol, while larvae were placed into near-boiling water for 1 min, and then transferred to vials containing 70% alcohol. All preserved specimens, whether pinned or in vials, have been labeled with appropriate

Table 7
Number of Collection Sites and Total Wet Weight of Each Plant Species Processed in Berleses at Each Laboratory

Species	No. Sites (Total Wet Weight kg)		Species	No. Sites (Total Wet Weight kg)	
	Townsville Lab	Brisbane Lab		Townsville Lab	Brisbane Lab
Hydrocharitaceae			**Non-Hydrocharitaceae (Continued)**		
Blyxa aubertii	2 (0.8)		*Marsilea ?drummondii*	6 (13.2)	1 (0.3)
Blyxa octandra	8 (42.2)		*Monochoria cyanea*	2 (2.4)	
Egeria densa		10 (163.9[2])	*Myriophyllum trachycarpum*	1 (10.9)	
Elodea canadensis		1 (0.4)	*Myriophyllum verrucosum*	5 (3.5)	2 (3.9)
Hydrilla verticillata	35 (330.6[3])	35 (344.1[4])	*Najas tenuifolia*	15 (41.0)	4 (24.0)
Ottelia alismoides	1 (2.4)		*Nelumbo ?nucifera*	1 (0.4)	
Ottelia ovalifolia	1 (2.1)	5 (16.9)	*Nitella* sp.	2 (1.7)	
Vallisneria gigantea		2 (4.6)	*Nymphaea gigantea*	9 (11.5[1])	2 (3.0)
Vallisneria spiralis	6 (2.5[1])		*Nymphaea mexicana*		2 (4.3)
Vallisneria ?spiralis	10 (64.4[4])	8 (110.6)	*Nymphoides indica*	10 (34.3)	5 (27.4)
Non-Hydrocharitaceae			*Philydrum lanuginosum*	1 (0.7)	
Aponogeton sp.	1 (0.7)		*Pistia stratiotes*	2 (2.9)	
Azolla ?pinnata	4 (4.2)	3 (1.0[1])	*Polygonum ?decipiens*	1 (1.0)	
Cabomba caroliniana	1 (2.5)	3 (5.0)	*Potamogeton crispus*	1 (0.7)	8 (23.2)
Ceratophyllum demersum	11 (69.8)	4 (8.6)	*Potamogeton javanicus*	3 (5.7)	
Ceratopteris sp.	1 (0.4)		*Potamogeton ochreatus*		2 (5.1)
Chara sp.	5 (4.7)		*Potamogeton ?pectinatus*		1 (1.5)
Cyperus sp.	1 (0.4)		*Potamogeton perfoliatus*		7 (16.5)
Eichhornia crassipes	3 (3.9)	1 (1.5)	*Potamogeton tricarinatus*	7 (14.3)	1 (6.1)
Eleocharis sp.	1 (2.1)		*Salvinia molesta*	1 (1.4)	1 (1.5)
Ipomoea aquatica	1 (10.7)		*Scirpus* sp.	1 (0.4)	
Leersia sp.	1 (0.4)		*Triglochin procera*		1 (6.0)
Lemna sp.	2 (0.6)		*Typha* sp.	1 (0.3)	
Ludwigia hyssopifolia	1 (1.07)		*Utricularia* sp.	4 (6.8)	
Ludwigia peploides	3 (7.6[1])	4 (5.0)	*Villarsia reniformis*	1 (0.7)	
Total				46 (708.1)	48 (784.4)

[1] Wet weight for 1 collection not recorded.
[2] Wet weight for 3 collections not recorded.
[3] Wet weight for 4 collections not recorded.
[4] Wet weight for 11 collections not recorded.

latitude and longitude, collection, and rearing information. Important herbivorous insects were sent to taxonomists for identification.

Growing Hydrilla

Our laboratory studies and maintenance of our insect cultures required a steady supply of hydrilla. To supplement field-collected hydrilla, we grew hydrilla at both of our laboratories. While our aquaria-grown hydrilla was lush, green, and suitable as food for moth larvae and weevil adults, the stems were usually too thin to accommodate the stem-boring HSB larvae. Thus in 1986, two plastic outdoor wading pools were set up at our Townsville laboratory to grow hydrilla (as well as other plants), while at our Brisbane laboratory, substrate containing hydrilla was collected from Atkinsons Dam, and placed into a bathtub at the laboratory. Slow-release fertilizer was added to the substrate, and the tub was then filled with water. Hydrilla, V. *?spiralis*, and V. *gigantea* readily grew in the tub; however, the hydrilla stems were still too thin to sustain larval development of HSB weevils. Only the hydrilla growing in the wading pool at our Townsville laboratory developed stems thick enough to accommodate HSB larvae. Algae frequently contaminated the cultures.

Nutrient Analysis of Hydrilla

The availability and abundance of certain nutrients, such as nitrogen, in aquatic plants has, in some cases (e.g. the *Salvinia* weevil, *Crytobagous salviniae*), been shown to be of great importance in regulating feeding, oviposition, and survival of aquatic herbivorous insects (Room and Thomas 1985). We therefore arranged to have 52 hydrilla samples analyzed for nitrogen and phosphorus content by the CSIRO Davies Laboratory in Townsville. These nutrient values, along with 2 *Egeria densa* samples, are presented in Table 8. There appears to be a greater variation for samples from different sites than for samples taken from the same site at different times. The lowest nitrogen value was recorded from Ross River Dam, and the lowest phosphorus value was recorded from Cattle Creek. Cattle Creek and Keelbottom Billabong recorded the lowest means for both nitrogen and phosphorus. Interestingly, the sample from Keelbottom Creek had a 3.4% and a 0.32% nitrogen and phosphorus content, respectively, while a sample taken from Keelbottom Billabong on the same date yielded 2% and 0.25% nitrogen and phosphorus content, respectively. The two highest values for both nitrogen and phosphorus were from SQ sites (Lake Borumba and Somerset Dam). Borrow Pit #2 and Alice River had the highest means in NQ for nitrogen and phosphorus, respectively. Although some samples were taken from hydrilla collections that were also used in feeding trials, there was not enough replicates (n=6) to test for a correlation.

Table 8
Nitrogen and Phosphorus Content for 52 Samples of Hydrilla from Australia, Analyzed by CSIRO Davies Laboratory, Townsville

Site	Collection	Collection Date	% N	% P
Alice River[1]	QLD86z264	29 Jul 86	4.35	0.670
Alice River	QLD86z271	02 Sep 86	3.55	0.505
Alice River	QLD86z281	06 Oct 86	3.10	0.315
Alice River	QLD87z205	12 Jan 87	3.30	0.580
Alice River	QLD87x213	09 Mar 87	2.50	0.490
Bohle River (Site 2)	QLD86z263	29 Jul 86	1.75	0.210
Bohle River (Site 2)	QLD87z208	30 Jan 87	2.60	0.290
Borrow Pit #2[1]	QLD86z262	22 Jul 86	3.80	0.435
Borrow Pit #2	QLD86z278	23 Sep 86	3.75	0.360
Borrow Pit #2	QLD87z207	27 Jan 87	4.00	0.330
Cattle Creek	QLD86z273	07 Sep 86	1.75	0.215
Cattle Creek	QLD87z202	06 Jan 87	1.40	0.180
Centenary Lakes	QLD86z260	14 Jul 86	3.05	0.410
Centenary Lakes	QLD86z268	18 Aug 86	4.00	0.580
Centenary Lakes	QLD86z275	16 Sep 86	3.25	0.430
Centenary Lakes[1]	QLD86z283	14 Oct 86	2.95	0.330
Centenary Lakes	QLD86z210	17 Feb 87	2.40	0.450
Centenary Lakes	QLD87z215	17 Mar 87	2.60	0.440
Clearwater Lagoon	QLD86z266	12 Aug 86	3.10	0.225
Enoggera Creek-Ashgrove[2,3]	SQL86z161	07 Jul 86	3.20	0.680
Enoggera Creek-Ashgrove[2,3]	SQL86z170	18 Aug 86	3.40	0.630
Fogg Dam	NTR86z202	22 Oct 86	1.80	0.250
Freshwater Creek	QLD86z259	14 Jul 86	3.50	0.365
Freshwater Creek	QLD86z267	18 Aug 86	3.65	0.350
Freshwater Creek	QLD86z274	16 Sep 86	2.50	0.235
Freshwater Creek	QLD86z282	14 Oct 86	2.40	0.235
Freshwater Creek	QLD86z209	17 Feb 87	3.80	0.450

(Continued)

[1] Also used in a feeding trial.
[2] *Egeria densa.*
[3] Also used in an oviposition test.

Table 8 (Concluded)

Site	Collection	Collection Date	% N	% P
Freshwater Creek	QLD87z216	17 Mar 87	3.50	0.400
Goose Ponds	QLD86z276	20 Sep 86	3.10	0.635
Holmes Jungle[1]	NTR86z203	28 Oct 86	2.90	0.350
Ingham Botanical Gardens	QLD86z272	07 Sep 86	3.55	0.365
Ingham Botanical Gardens	QLD87z201	06 Jan 87	2.70	0.320
Ingham Botanical Gardens	QLD87z212	02 Mar 87	3.60	0.360
Keelbottom Billabong	QLD86z270	02 Sep 86	1.25	0.205
Keelbottom Billabong	QLD86z280	06 Oct 86	1.95	0.270
Keelbottom Billabong	QLD87z204	12 Jan 87	2.00	0.250
Keelbottom Creek	QLD87z203	12 Jan 87	3.40	0.320
Laboratory Reared[1]		16 Jul 86	2.00	0.270
Lake Borumba	SQL86z237	30 Jun 86	3.70	0.300
Lake Borumba	SQL86z251	27 Oct 86	4.50	0.720
Moogerah Dam			4.00	0.400
North Pine Dam			2.80	0.220
Ross River Dam[1]	QLD86z261	21 Jul 86	2.95	0.300
Ross River Dam	QLD86z269	25 Aug 86	3.25	0.300
Ross River Dam	QLD86z279	29 Sep 86	3.80	0.355
Ross River Dam	QLD87z206	19 Jan 87	2.30	0.300
Ross River Dam	QLD87z211	23 Feb 87	2.70	0.270
Ross River Dam	QLD87z217	06 Apr 87	1.70	0.250
Ross River Dam	QLD87z218	06 Apr 87	2.30	0.200
Somerset Dam[3]	SQL86z232	02 Jun 86	4.40	0.680
Stuart Creek	QLD86z265	05 Aug 86	3.05	0.380
Stuart Creek	QLD86z277	23 Sep 86	2.80	0.325
Stuart Creek	QLD87z214	09 Mar 87	3.10	0.540
Yellowater Billabong	NTR86z201	21 Oct 86	2.70	0.410

For comparison, we also sent six samples of dried and ground hydrilla from five of our sites to Ann Jones at the Fort Lauderdale Aquatic Weeds Laboratory in Florida for analysis. This laboratory used the following methods in their analysis.

Two subsamples (0.10 g) were digested with 3 ml of sulfuric acid: hydrogen peroxide mix (350:420) and brought to 50-ml volume with ultra-pure deionized water. The digestates were analyzed for calcium, iron, magnesium, manganese, potassium, and zinc content by atomic absorption spectroscopy. Total ammonium nitrogen was determined with the Nessler reagent. Total ortho-phosphate phosphorus was determined by the Ascorbic Acid Method. National Bureau of Standards tomato leaves were used as reference samples.

The results of their analyses are presented in Table 9. To put our Australian hydrilla values in perspective, this laboratory also analyzed two hydrilla samples collected in Florida, from Davie Lake and from pools at the University of Florida's Institute of Food and Agricultural Science (IFAS). The most striking picture emerging from Table 9 is the difference between hydrilla in Australia and Florida. For ammonium nitrogen, ortho-phosphate phosphorus, and potassium, both the highest and lowest values were from the two Florida sites, with the samples from all five Australian sites falling between these values. Calcium values for the Florida sites were many times higher than for the Australian sites. This is a reflection of the calcareous bedrock which underlies most Florida sites. In contrast, the Australian sites had much higher levels of iron and manganese. Australian soils are very old and subject to high levels of oxidation which increase their ferrous content.

Table 9
Nutrient and Mineral Content of Hydrilla from Australia and Florida, Analyzed by the Fort Lauderdale Aquatic Weeds Laboratory

Site	Collection No. and Date	% NH4-N	% P04-P	% K	% Mg	% Ca	Fe µg/g	Mn µg/g	Zn µg/g
Borrow Pit[1]	22/7/86 (QLD86z262)	4.55 3.91	0.35 0.36	3.57 3.21	1.10 0.92	1.44 1.14	1,390 1,255	1,500 1,700	60 68
Stuart Creek	5/8/86 (QLD86z265)	4.48 4.72	0.26 0.29	2.94 3.45	0.35 0.51	3.84 4.20	18,000 40,000	24,500 25,300	92 108
Ross River Dam	29/9/86 (QLD86z279)	3.66 3.58	0.27 0.32	3.75 2.85	0.81 0.77	0.78 0.78	2,300 2,300	3,400 2,400	74 86
Centenary Lake	4/10/86 (QLD86z283)	2.74 3.11	0.34 0.32	2.76 2.16	0.52 0.43	0.33 0.54	13,600 13,400	2,600 2,500	238 240
Keelbottom Billabong	2/9/86 (QLD86z270)	1.46 1.60	0.18 0.19	3.27 3.27	0.42 0.35	0.30 0.09	24,500 26,000	11,000 11,000	81 106
Keelbottom Billabong	6/10/86 (QLD86z280)	1.50 1.81	0.24 0.23	3.42 2.58	0.41 0.31	1.71 1.59	92,000 90,000	6,500 6,500	325 325
Davie Lake (Florida)		1.32 1.27 1.60	0.11 0.09 0.11	1.69 1.85 2.23	0.56 0.55 0.56	10.20 10.95 8.58	800 720 860	50 50 75	70 63 76
IFAS Pools (Florida)		4.48 4.96 4.64	0.79 0.79 0.79	4.89 2.22 3.63	0.34 0.36 0.33	4.95 4.59 5.34	430 420 440	115 120 120	202 208 204

[1] Also used in a feeding trial.

6 The Hydrilla Stem Boring Weevil (Coleoptera: Curculionidae)

Introduction

We collected a variety of weevil species during this project, including 10 species from the Bagoine genus, *Bagous*. However, only one species proved to be promising for the biocontrol of hydrilla. This species (Figure 2), now formally described as *B. hydrillae* O'Brien (O'Brien and Askevold 1992), was first collected by the senior author during preliminary surveys conducted in NT in 1982 and 1983. We collected *B. hydrillae* at NQ and SQ sites soon after the establishment of the laboratories in these regions in 1985 and also began collecting them in northern NSW in 1986. In our reports, we have referred to this undescribed weevil as the hydrilla stem borer (HSB) or *Bagous* n. sp. Z (Figure 2). We studied the field host-specificity, life-history, laboratory feeding, and oviposition/survival host-specificity of this weevil in Australia in 1985 and 1986. HSB was imported into the Gainesville quarantine facility in April 1987 (Buckingham 1988) and released in the field in March 1991 (Center 1992). Although it has not yet conclusively established, HSB has persisted at low levels at one release site in southern Florida. The senior author (J. K. Balciunas) collected two adult weevils 70 days after releases were made at this site (Lake Osborne, Palm Beach County). These were considered to be F1 progeny of the original release weevils (Center 1992). We believe that this is potentially one of the most damaging insects yet released upon hydrilla in the United States. It has a short life-cycle, both the larvae and adults damage hydrilla, and can fragment hydrilla stems to such an extent that at some Australian hydrilla sites all hydrilla within a meter of the surface was removed.

Taxonomy

Initially, our HSB specimens were identified as *B. australasiae*, one of only three *Bagous* weevils then known from Australia. *Bagous australasiae*, along

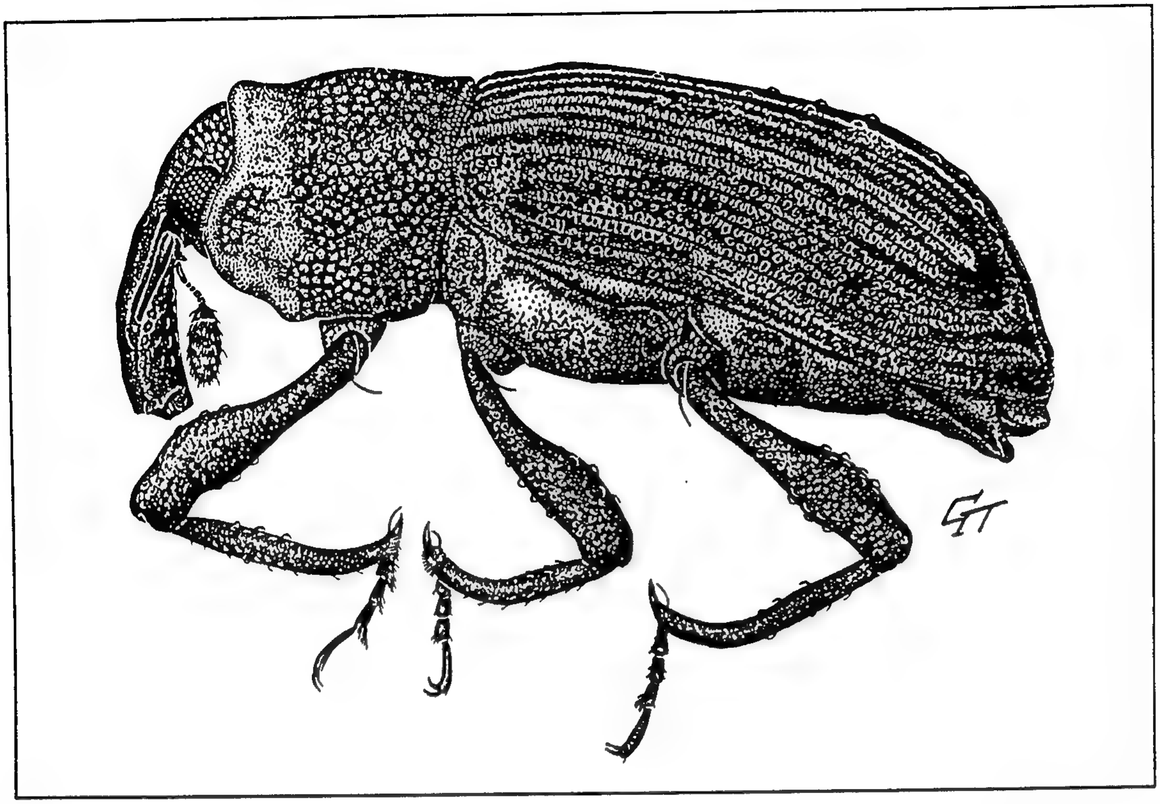

Figure 2. Lateral view of HSB *bagous hydrillae,* the first Australian biological control agent studied during this project

with *B. adelaidae* and *B. clarenciensis,* were described almost 100 years ago by Blackburn (1894a,b). However, in mid-1987, Dr. C. W. O'Brien (Florida Agricultural and Mechanical University, Tallahassee) compared our specimens with the type specimens of *B. australasiae* from the British Museum of Natural History and determined that our species was new and undescribed. This weevil, as well as seven additional *Bagous* collected during this project, has now been described by Dr. O'Brien (O'Brien and Askevold 1992). The earliest known specimen of HSB was collected at a light trap in the NT in 1976 (O'Brien and Askevold 1992). The holotype of HSB comes from our Townsville laboratory colony of weevils from Keelbottom Billabong and will be deposited in the Australian National Insect Collection (ANIC) in Canberra. In addition, 449 paratypes from the same colony will be deposited at various museums around the world.[1] The allotype is from our Brisbane laboratory colony of HSB weevils collected from Atkinsons Dam and will also be deposited in the ANIC. This species has now also been collected by other people from our NT sites and other nearby sites (O'Brien and Askevold 1992). Nearly all of the aquatic weevils collected, reared, or colonized during this project have been sent to, and retained by, Dr. O'Brien.

[1] Personal Communication, C. W. O'Brien.

Life History and Biology

Our field observations and laboratory life-history studies (Balciunas and Purcell 1991) have already been published (a copy of which is provided in Appendix C). An abbreviated life-history of HSB in the field appears to be as follows. The adults fly from the shoreline to hydrilla which has "topped out" at the water surface. The adults crawl down the hydrilla beneath the water surface where they feed and oviposit. Females insert single eggs (sometimes two) into punctures in the stem, usually near the leaf nodes. When the larva emerge, they tunnel within the stem. This tunneling, as well as feeding by adults, causes fragmentation of the stem. These fragments float to the shore (resulting, at times, in windrows of fragments) where larvae complete their development. The prepupae then exit the stems and pupate in the moist soil and/or moist hydrilla fragments. We believe this is why large numbers of both adults and larvae have been collected from stranded material. The amount of stranded material along the shoreline was often directly related to the size of the populations of HSB present.

Distribution of HSB in the Field

As can be seen from Tables 10 and 11, the majority (87%) of HSB specimens were collected in SQ and NSW. This is due to the higher populations of HSB at lentic sites, such as reservoirs and ponds, which were more common in SQ/NSW. In SQ, five sites (Lake Borumba, Maroon Dam, Moogerah Dam, North Pine Dam, and Somerset Dam) all had higher average densities of HSB than the best NQ site (Keelbottom Billabong). Three other SQ/NSW sites (Atkinsons Dam, Lismore Ski Lake, and Petrie Park) also had higher average HSB densities than the second best NQ site (Ross River Dam).

Collections at lentic sites (Atkinsons Dam, Hinze Dam, Lake Borumba, Lismore Ski Lake, Maroon Dam, Moogerah Dam, North Pine Dam, Petrie Park, and Somerset Dam) yielded 99% of the HSB collected in SQ/NSW, even though they only comprised 43.5% of the total 586 collections made from the Brisbane laboratory. The abundance of HSB at lentic sites probably reflects the necessity for HSB larvae to float inside hydrilla fragments to the water's edge, where they pupate in the soil. In rivers and creeks, HSB larvae are more likely to be carried downstream than to reach suitable pupation sites. The pupation requirements of HSB may restrict the establishment of this weevil at sites in the United States.

In NQ, our most consistent sites for collecting HSB were Keelbottom Billabong and Ross River Dam. We established laboratory colonies of HSB from both of these sites. Keelbottom Billabong had many more HSB than Keelbottom Creek (of which the billabong is merely an overflow), further verifying HSB's preference for lentic sites. Of the 1,094 HSB collected by the Townsville laboratory, 93% were collected at four lentic sites (Ross River Dam,

Table 10
Sites of North Queensland Quantitative Collections with HSB

Site Name	Host Plant	No. Coll.	% With HSB	HSB Larvae	HSB Adults	Mean HSB/kg	Max HSB/kg
Alice River	(Hyd)	60	13.3	41	3	0.4	66.7
Bohle River #1	(Hyd)	4	25.0	0	1	0.2	0.9
Bohle River #2	(Hyd)	19	5.2	2	0	0.1	1.9
Fogg Dam[1]	(Hyd)	4	25.0	1	0	0.4	1.4
Keelbottom Billabong	(Hyd)	21	42.9	483	29	15.0	82.6
Keelbottom Creek	(Hyd)	11	27.3	29	1	2.0	78.3
Lake Moondarra	(Hyd)	2	100.0	8	3	3.8	7.3
Louisa Creek	(Hyd)	8	12.5	2	0	0.1	5.7
Ross River Dam	(Cer)	30	20.0	15	5	1.1	9.4
	(Hyd)	53	24.5	135	40	3.8	200.0
	(Naj)	31	16.1	203	9	11.3	568.6
	(V1?sp)	23	30.4	79	4	5.1	55.7
Stuart Creek	(Otal)	5	20.0	0	1	0.1	2.9
36 other sites		738	0.0	0	0	0.0	0.0
		1,009	5.7	998	96	1.5	568.6

[1] Northern Territory site.

Keelbottom Billabong, Lake Moondarra, and Fogg Dam), which comprised only 24% of the 1,009 berlese collections made from the Townsville laboratory. Many of the collections of HSB from Alice River (the best lotic site in NQ for collecting HSB) were made when this site was drying out, and there was no longer any flow.

Of the 586 collections made by the Brisbane laboratory, 31 were of shore-stranded plant material. Of these 31 collections, 24 were of hydrilla at lentic sites. These 24 collections (4% of the total number of Brisbane laboratory collections) yielded 25% of the total number of HSB collected by the Brisbane laboratory. Hydrilla was the only aquatic plant species that formed extensive windrows of stranded material. These data show that shore-stranded samples at lentic sites were the most likely collections to contain HSB. However, the few shore-based samples collected by the Townsville laboratory yielded just 20 HSB.

Table 11
Sites of South Queensland and New South Wales Quantitative Collections with HSB

Site Name	Host Plant	No. Coll.	% With HSB	HSB Larvae	HSB Adults	Mean HSB/kg	Max HSB/kg
Alipou Creek[1]	(Hyd)	9	11.1	13	0	0.86	7.9
	(V1?sp)	3	66.6	47	0	0.42	28.9
Atkinsons Dam	(Hyd)	10	30.0	13	157	12.5	93.3
Grafton Boat Club[1]	(Egr)	19	10.5	1	1	<0.1	0.9
Hinze Dam	(Hyd)	2	50.0	3	2	1.6	3.3
Lake Borumba	(Hyd)	31	64.5	445	299	15.2[2]	82.9
	(Naj)	12	25.0	13	0	0.8	4.5
	(V1?sp)	16	56.3	1,041	97	53.5	652.5
Lismore Ski Lake[1]	(Hyd)	5	20.0	49	13	10.34[3]	29.8
Maroon Dam	(Hyd)	12	33.3	266	133	0.2	256.8
	(Ptcr)	4	33.3	0	1	22.0	0.7
Mary River-North	(Hyd)	4	25.0	2	3	1.1	6.0
Mary River-Conondale	(Hyd)	22	<0.1	0	1	<0.1	0.7
Moogerah Dam	(Hyd)	20	40.0	791	190	31.2	237.9
	(Ptcr)	2	100.0	8	3	3.9	6.5
North Pine Dam	(Hyd)	29	48.3	1,435	333	41.8	635.9
	(Ndin)	6	33.3	2	1	0.3	1.1
	(V1?sp)	7	28.6	18	1	2.0	9.4
Petrie Park	(Hyd)	13	46.1	175	8	9.8	82.6
Somerset Dam	(Cer)	3	33.3	9	14	5.9	13.7
	(Hyd)	23	65.2	1,010	395	38.8	164.0
	(V1?sp)	14	57.1	292	43	17.4	91.3
Yabba Creek-Imbil	(V1?sp)	14	14.3	5	1	0.3	3.1
	(Ptpr)	4	25.0	1	0	0.2	1.6
34 other sites		302	0.0	0	0	0.0	0.0
		586	18.9	5,639	1,707	9.3	652.5

[1] NSW site.
[2] Wet weight for 1 collection not recorded.
[3] Wet weight for 2 collections not recorded.

Of the HSB collected by the Brisbane laboratory, 77% were collected as larvae; of the HSB collected by the Townsville laboratory, 91% were collected as larvae. Berleses 20 cm in diameter were used to process samples in the Townsville laboratory, whereas in the Brisbane laboratory berleses were 50 cm in diameter. Although larger quantities of plants were processed in the berleses in the Brisbane laboratory, higher wattage light bulbs, along with greater relative exposed surface area of the plant material, dried these samples faster than the plant material in our Townsville laboratory berleses. This may have caused a greater mortality of less mobile insects in the larger berleses. If the funnels used in the Brisbane laboratory did increase mortality of the internal feeding HSB larvae, the true abundance of HSB at SQ field sites may have been underestimated. Part of the difference in the proportions of larval and adult HSB collected by the Brisbane laboratory as compared to the Townsville laboratory may also be due to better pupation conditions at SQ sites, resulting in a higher level of adult emergence.

HSB is present at Lake Moondarra (near Mount Isa). This man-made reservoir is 730 km from our nearest hydrilla sites on the east coast of Australia and over 1,000 km from our hydrilla sites in the Kakadu National Park (NT). Due to the isolation of Lake Moondarra, only two collections were made there, both of which yielded HSB. Although not wishing to draw too strong an inference from just two collections, and not excluding the possibility of other hydrilla sites occurring between this site and the major collecting areas in NQ and NT, the presence of HSB at this remote site demonstrates the dispersal and survival capabilities of this weevil.

Field Hosts of HSB

Hydrilla was the most common field host of HSB; 77% (6,524 out of 8,440) of HSB specimens were collected on hydrilla, even though hydrilla comprised less than 45% (by wet weight) of the plant material collected. The only other plant upon which HSB was collected in large numbers was *V. ?spiralis* (Tables 12 and 13). Of the seven other Hydrocharitaceae plant species of which collections were made, HSB was only found on *E. densa* (1 larva and 2 adults) and *O. alismoides* (1 adult only). Of the five non-Hydrocharitaceae species upon which HSB was collected, only *N. tenuifolia* yielded significant numbers. Of the 203 HSB larvae collected from *N. tenuifolia* in NQ, 199 came from just one collection (QLD88z601).

Colonies

In the laboratory, mortality of HSB adults kept in water was high. This was probably due to adults struggling against the surface tension of the water. Likewise, the HSB larvae, if the target host was kept in water, showed high mortality when the larvae attempted to transfer to fresh host material. We

Table 12
Plant Species Upon Which HSB was Collected in North Queensland and Northern Territory Quantitative Field Collections

Plant Species	Total No. Sites	% With HSB	Total No. Coll.	% With HSB	HSB Larvae	HSB Adults	Mean HSB/kg
Hydrocharitaceae							
Hydrilla verticillata	35	25.7	341	11.4	701	77	2.4
Ottelia alismoides	1	100.0	5	20.0	0	1	0.4
Vallisneria ?spiralis	10	10.0	89	7.9	79	4	1.3
Non-Hydrocharitaceae							
Ceratophyllum demersum	11	9.1	112	5.4	15	5	0.3
Najas tenuifolia	15	6.7	68	7.4	203	9	5.2
36 other species	35	0.0	394	0.0	0	0	0.0
	46	21.7	1,009	5.7	998	96	1.6

Table 13
Plant Species Upon Which HSB was Collected in South Queensland and New South Wales Quantitative Field Collections

Plant Species	Total No. Sites	% With HSB	Total No. Coll.	% With HSB	HSB Larvae	HSB Adults	Mean HSB/kg
Hydrocharitaceae							
Egeria densa	10	10.0	121	1.7	1	1	<0.1
Hydrilla verticillata	35	34.3	247	30.8	4,202	1,544	16.7
Vallisneria ?spiralis	8	62.5	79	29.0	1,403	142	14.0
Non-Hydrocharitaceae							
Ceratophyllum demersum	4	25.0	8	12.5	9	14	2.7
Najas tenuifolia	4	25.0	19	15.8	13	0	0.5
Nymphoides indica	5	20.0	20	10.0	2	1	0.1
Potamogeton crispus	8	25.0	16	18.8	8	4	0.5
Potamogeton perfoliatus	7	14.3	15	6.7	1	1	0.1
16 other species	21	0.0	61	0.0	0	0	0.0
	48	31.3	586	19.1	5,639	1,707	9.3

therefore maintained colonies on hydrilla in clear plastic containers, which were lined with moist toweling, but had no other water. Adults from these colonies were used for laboratory studies and host-testing. The hydrilla was replaced every week, and the spent plant material was set aside in rearing chambers, where larvae developed within the stems. It was very important to keep the moisture level high to prevent desiccation. Prepupae were removed from these chambers, and placed onto moist filter paper (or moist soil/ vermiculite mixture) where they pupated. Occasionally the host plant material was contaminated with algae, which entangled the legs of adults, and contributed to their mortality.

At the Townsville laboratory, colonies of HSB from Ross River Dam, Keelbottom Billabong, and Lake Moondara were established in late 1985. In mid-1986 (the southern winter), the "quality" of hydrilla, as assessed visually, declined, as did HSB colonies. During this time, the Lake Moondara colony, which was small to begin with, died out. Daily mortality of adults increased from 1.5 to 5% to 10 to 25%. Pupal mortality increased from 20 to 30% to 50 to 90%. Several laboratory populations declined to less than 20 individuals. Dissection of 15 dead adults revealed their guts to be empty, so they may have starved. During that time, our colony of *Nymphoides* weevils (see Chapter 9) also died out. In March 1987, the Townsville colonies of HSB were terminated due to low weevil numbers. A larger colony of HSB was maintained at the Brisbane laboratory. This colony consisted of individuals collected from a number of different sites and was terminated in 1988 after HSB became established in quarantine.

HSB Feeding-Specificity Trials

Once we had discovered HSB at our field sites, we immediately began using the adults for no-choice feeding tests. These relatively quick feeding tests provided us with an estimate of HSB's host range. They also helped us choose which plant species should be collected intensively in the field and be more thoroughly investigated in the time-consuming oviposition/development tests.

Methods

Most feeding tests involved confining one adult weevil, along with a portion of test plant and a small (<1 cm) amount of water, in individual 300-ml plastic containers for 2 days. Usually a 1-cm portion from the tip of a plant was used in the tests. Many additional tests (mostly on hydrilla) consisted of two weevils in each plastic feeding cup for only 1 day. At the end of each test, the plant material was examined and the feeding score visually assessed along the guidelines shown in Appendix D. Usually, 25 tests were run simultaneously on the same host plant, and these were considered as one trial. Due

to fluctuations in the number of HSB weevils available for testing, the number of tests per trial sometimes varied.

Between September 1985 and November 1986, we conducted a total of 217 feeding trials at the Townsville laboratory: 79 trials used hydrilla as the test plant (Appendix F), while a further 138 trials used one of 33 aquatic plant species from 21 families as the test plant (Appendix E). Ten trials run with *Utricularia* weevils from Cattle Creek and *Blyxa* weevils from Whitfield Creek are listed in Appendix G.

The trials for host-specificity were analyzed using the minimum significant range (MSR) test (Sokal and Rohlf 1981). MSR was chosen over the least significant difference (LSD) test because it was an unplanned comparison, and LSD is considered more appropriate for planned comparisons (Sokal and Rohlf 1981). Also, the MSR test is more conservative than LSD, detecting less differences between trials. This more conservative position is pertinent to biological control programs where caution is a top priority. For comparison, we also analyzed these trials using the LSD test, and there was little difference in the results they produced.

Trials eliminated from the analysis

Our final analysis of HSB host-specificity did not include all of the feeding trials. Our initial feeding tests conducted from September to October 1985 used weevils from colonies which, on later inspection, proved to be contaminated by what we call the *Nymphoides* weevil (see Chapter 9). Although the level of contamination was low (<10%), and did not persist beyond 2 months, we excluded the first 73 feeding trials on 18 plant species conducted during this time (September-October 1985) from the analysis. These trials are marked with an asterisk (*) in Appendixes E and F.

Until June 1986, our feeding tests were directed at determining host-specificity and consisted primarily of 2-day tests with one weevil in each feeding cup. After that time, we were primarily interested in elucidating the effects of host quality on HSB feeding and oviposition response. In order to perform a greater number of tests, the tests were then changed to 1-day tests with 2 weevils per feeding cup. A t-test between trial Hyd 14 (1-day, 2-weevil tests) and trial Hyd 15 (2-day, 1-weevil tests) indicated that the mean feeding score for the 2-day, 1-weevil trials was significantly lower ($t = 4.9$), and therefore cannot be compared with the 1-day, 2-weevil trials. Therefore, our analysis of host-specificity only includes 2-day, 1-weevil trials. The 58 1-day, 2-weevil trials on 5 plant species omitted from the host-specificity analysis include all those listed as such in Appendix F, as well as those marked by a cross-hatch (#) in Appendix E. Most of these omitted trials ($n = 54$) were on hydrilla, testing its suitability for oviposition.

It was not possible to keep the number of replicates even for all trials. Since the number of weevils used in trials depended on their availability in our

laboratory colonies, the number of replicates ranged from less than 10 up to 65. Deaths were a regular occurrence during the feeding tests, so even trials that began with the same number of replicates, often did not finish that way. Often there was a delay of up to several days from when test plants were collected in the field until they were used in laboratory. As this was likely to affect the results of laboratory feeding and oviposition tests, we tested the effects of host age upon feeding results for hydrilla (see below). We determined that any tests that utilize host plants collected more than 2 days previously were likely to elicit significantly reduced feeding scores. Thus, we have also eliminated from our analysis feeding trials that utilized host material collected three or more days previously (Hyd 19), or had less than ten replicates (Azo 3-5, Ipo 1-4, Pol 3, Phl 1).

Trials combined for the analysis

Thus, for our analysis, we include only the 72 feeding trials which are statistically comparable, and in which we have the most confidence. Of these, feeding did not occur in 27 trials on 17 plant species. The 27 zero values are represented by a single bar in Figure 3. In order to reduce the complexity of the graph illustrating our analysis, we pooled some of the 45 remaining trials that utilized the same host plant, from the same site, and HSB weevils from the same colony. Among these were trials Hyd 11, 18, and 59, which all involved Keelbottom Billabong colony weevils, tested on fresh hydrilla, from Ross River Dam. A one-way ANOVA showed that the results from these three trials were not significantly different ($F = 0.2$), thus they were combined. A similar situation occurred for trials Hyd 9, 12, and 57, except the fresh hydrilla was from Alice River. A t-test also showed that trials Bloc 1 and 2 were not significantly different ($t = 0.16$), so they too were combined for the graph and analysis. Thus, the results include 42 columns (45 trials on 16 species, including *N. indica,* which had shown no feeding in another trial). This totals to 43 columns (72 trials on 32 species).

Results and discussion

Nine of the eleven highest scoring feeding trials (≥3.46) in the analysis were on hydrilla. The remaining two highest scoring trials were on *B. octandra* (also Hydrocharitaceae). It was surprising that HSB fed so heavily on *B. octandra* in the laboratory, as no HSB were ever found upon this plant in the field, despite 73 collections of this species during our extensive surveys. *Ottelia ovalifolia* and *O. alismoides* (both Hydrocharitaceae) showed feeding scores that were not significantly lower than 8 and 6 of the 12 hydrilla trials in the analysis, respectively. However, only one HSB (an adult) was found in 22 collections of these two plant species. Another Hydrocharitaceae, *E. densa,* had moderate feeding scores, although only one adult and two larvae were found in 114 field collections of this species.

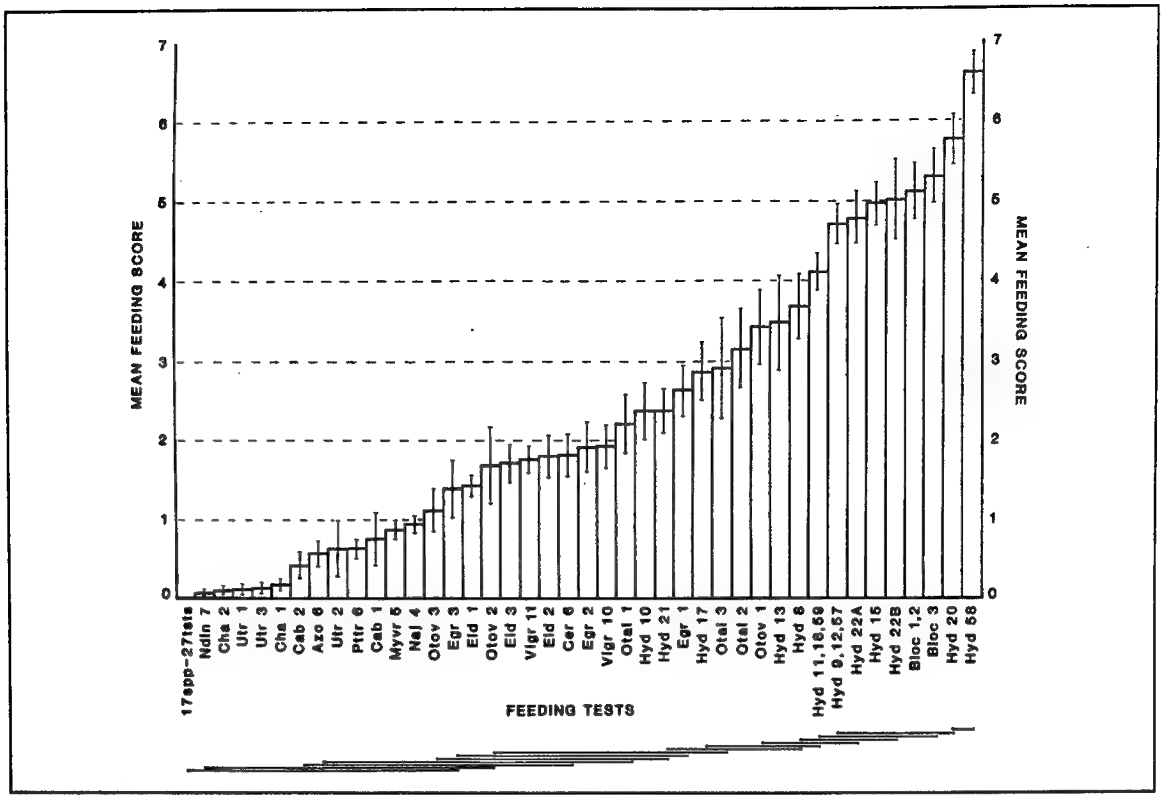

Figure 3. Histogram showing mean feeding scores for 45 trials of the hydrilla stem boring weevil, *Bagous hydrillae,* on 16 aquatic plant species. The vertical lines on each bar represent the standard error. All trials underscored by the same horizontal line are not significantly different (P = 0.05), as indicated by the MSR procedure

Vallisneria ?spiralis and *N. tenuifolia* were the only other species, besides hydrilla, to have provided moderate numbers of HSB in the field. The feeding scores for *V. ?spiralis* were not significantly different from the three lowest of the 12 hydrilla feeding trials included in the analysis. The feeding score for *N. tenuifolia* was significantly lower than all of the hydrilla trials, yet it was the third most abundant field host (Tables 12 and 13). However, 92% (199 out of 216) of the larvae collected on *N. tenuifolia* came from just one collection, where the host was intertwined with hydrilla. Pieces of hydrilla may have contaminated this sample, and therefore the true host potential of *N. tenuifolia,* under normal field conditions, may have been overestimated. Alternatively, this feeding test result may be abnormally low. The combined average for 3 other trials (Naj 1-3) is 3.15 (n = 33), which, if they had been included in the analysis, would be not significantly lower than 6 of the 12 hydrilla trials used in the analysis. These 3 trials on *N. tenuifolia* were not included in the analysis because they were undertaken during October 1985 and may have been subject to contamination by the *Nymphoides* weevil.

The only non-Hydrocharitaceae with feeding scores similar to hydrilla were *C. demersum* and *Eleocharis* sp., although their feeding scores were not significantly lower than the three lowest scoring hydrilla trials (Hyd 10, 21, and 17).

Ceratophyllum demersum (our second most commonly collected plant) was often found in close association with hydrilla at many of our field sites. However, only 24 adults and 19 larvae were found upon this species in 120 field collections (Tables 12 and 13). No HSB were ever found on *Eleocharis* sp. in the field.

In the laboratory, HSB fed upon 17 plant species from 4 families; 16 of these species from 3 families were included in the feeding host-specificity analysis. *Nitella* sp., with an overall average feeding score of 0.14 (n = 51), was the only species fed upon by HSB which was not included in the analysis. Tests upon this plant were eliminated due to possible contamination by the *Nymphoides* weevil. *Nitella* sp. and *N. indica* were the only two species that HSB fed upon in some trials but not others. Five Hydrocharitaceae and two non-Hydrocharitaceae species had feeding scores that were not significantly different from at least one of the hydrilla trials.

Effects of Hydrilla Post-Collection Age on Feeding

Our hydrilla feeding trials showed a great deal of variability. We suspected that a portion of this variability was due to a decline in hydrilla's acceptability as a host after hydrilla was "harvested." Three series of trials were run on hydrilla to determine the effect of host age on HSB feeding. All three series were performed in our Townsville laboratory using HSB weevils originating from the Brisbane laboratory colony. For each series of trials, hydrilla was harvested from a field site and brought to the laboratory where it was held in a plastic bag. Each day, for the next 9 days, some hydrilla was taken from the bag, then placed in a 30-ml container with a pair of HSB weevils for 24 hr. Thus, each day's trial used consecutively "older" host plant material. The feeding damage was scored using the criteria listed in Appendix D. Each day of these trials, a sample of hydrilla was analyzed for nitrogen and phosphorus by the CSIRO Davies Laboratory to determine if nutrient content changed during the 9 days of each experiment. These data (along with similar data for hydrilla collected from Louisa and Keelbottom Creeks) are presented in Table 14. The first series (Hyd 23-31) was run from 27 April 1986 to 6 May 1986 and used hydrilla collected from Alice River. The second (Hyd 34-43) and third (Hyd 44-53) series were run simultaneously from 10 June 1986 to 20 June 1986, using hydrilla collected from Alice River and Borrow Pits #2, respectively.

For all three series, Cochran's test showed that the variances were homogeneous enough not to require transformation. One-way ANOVA's, performed on each series, showed the results to be significantly different (F = 101.54, 25.65, and 18.24, respectively). Thus, both Tukey's and Student-Newman-Keuls' (SNK) "a posteriori" multiple comparison tests were performed to determine where the differences occurred. All tests followed Zar (1982).

Table 14
Percentage Nitrogen and Phosphorus Content of Progressively Aged Hydrilla

Site	Date	Days Since Harvesting	% N	% P
Alice River	May 1986	0	5.40	0.370
		1	6.00	0.445
		2	5.60	0.365
		3	5.05	0.460
		4	5.00	0.385
		5	5.05	0.400
Alice River	June 1986	0	5.45	0.565
		1	5.50	0.575
		2	5.30	0.585
		3	3.65	0.450
		4	4.35	0.495
		5	5.10	0.505
		6	4.95	0.475
		7	4.70	0.350
		8	4.90	0.380
		9	5.00	0.475
Borrow Pits	June 1986	0	3.75	0.460
		1	3.60	0.485
		2	3.70	0.525
		3	5.15	0.600
		4	3.45	0.460
		5	3.30	0.475
		6	4.20	0.325
Louisa Creek	May 1986	0	4.60	0.425
		1	5.05	0.410
		2	5.05	0.430
		3	4.65	0.385
		4	5.00	0.385
		5	5.00	0.370
Keelbottom Creek	May 1986	0	2.80	0.265
		1	2.95	0.280
		2	2.90	0.280
		3	2.25	0.305
		4	2.80	0.285
		5	3.10	0.280

The results of all three series are graphically illustrated in Figure 4. The days between which a significant decline (using the SNK test) in feeding occurred are indicated by lines beneath the graph. Only the SNK test was represented on this graph as it is more powerful (detecting more differences) than the Tukey's test. For the first series, both the Tukey and SNK tests gave the same results, showing that the feeding rate on hydrilla declined significantly after the second day, and that there were further significant decreases in feeding score between days 3 and 4 and days 5 and 6. For the second series, Tukey's test showed a significant decline in feeding score after the third day, but no further significant decreases. The SNK test for the second series showed a significant decline in feeding score after the second day and also after the third day. For the third series, Tukey's test showed a significant decline in feeding score after the second day but no further significant decreases after that. The SNK test for the third series showed a significant decline in feeding score after the second day and further significant decreases between days 4 and 5 and days 5 and 6. There was no discernible pattern of change in the nitrogen and phosphorus content of the hydrilla over the duration of these experiments, and the values fluctuated daily (Table 14). Feeding did not appear to be related (at least not directly) to the abundance of these nutrients in hydrilla.

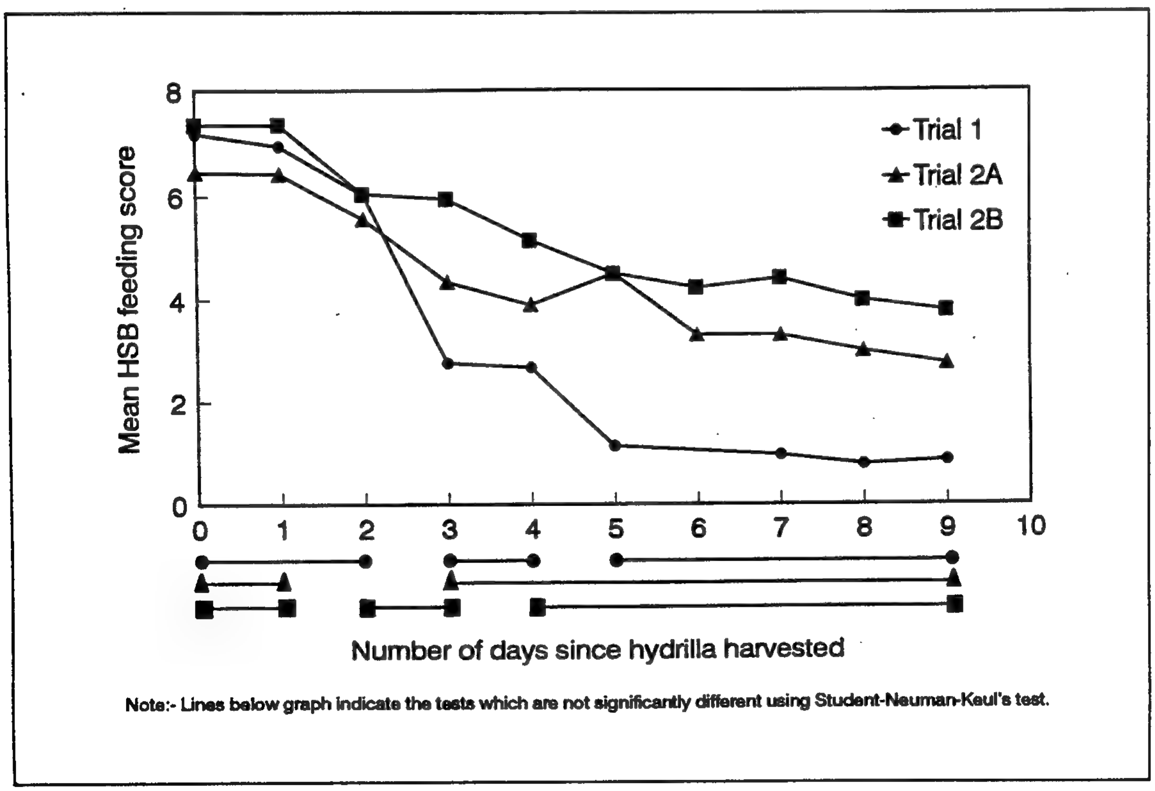

Figure 4. Graph depicting the decline in feeding by the hydrilla stem boring weevil, *Bagous hydrillae*, on hydrilla harvested up to 9 days previously. All trials underscored by the same horizontal line are not significantly different (P = 0.05), as indicated by Student-Newman-Keuls test

Although the results vary slightly, the point they make is clear—hydrilla collected more than 2 days prior to the initiation of a feeding test will produce a significantly lower feeding score than if the hydrilla was collected on the same day. Hydrilla that is more than 2 days old usually still looks fresh and healthy, and there is a temptation to assume it is still in "good condition," and use it for feeding trials. Our results clearly show that, at least for hydrilla from NQ, this is an unacceptable procedure.

Feeding on Hydrilla by Different Populations of HSB

Several analyses were performed that compared the feeding trials by weevils from different populations. Trials Hyd 8, 9, and 10 used weevils from SQ, Keelbottom Billabong, and Ross River Dam, respectively. The hydrilla host plant was collected from one sample at Alice River, and a one-way ANOVA (F = 8.18, sign.) followed by a "a posteriori" multiple comparison tests showed that only trials 9 and 10 differed significantly (Tukey's test), while the SNK test showed that all three were significantly different from each other. T-tests between Cha 1 and Cha 2 (t = 0.07); Cab 1 and Cab 2 (t = 1.1); V1?sp 10 and V1?sp 11 (t = 0.55) have also shown no significant differences in the feeding scores obtained by weevils from our Keelbottom Billabong and Ross River Dam colonies. One-way ANOVA's performed for Eld 1, 2, and 3 and Otal 1, 2, and 3 showed no significant difference in feeding scores (F = 0.87 and 0.96, respectively) for the three weevil populations tested. A one-way Anova for Egr 1, 2, and 3 revealed a significant difference (F = 5.93) in the feeding scores for each population tested. Tukey's test failed to detect where this difference occurred, but the SNK test showed that feeding by SQ weevils was significantly higher than Ross River Dam and Keelbottom Billabong weevils. For the one-way ANOVA between Otov 1, 2, and 3 (F = 5.93 sign.), both the Tukey's and SNK tests showed that weevils from the Keelbottom Billabong population had significantly higher feeding scores than weevils from the SQ and Ross River Dam populations. No HSB weevil population regularly had higher feeding scores than any other population, and their ranking varied with each trial and each plant species tested.

Feeding on Hydrilla from Different Collection Sites

Since during our feeding tests, we used hydrilla from many different field sites, we analyzed our data to see if hydrilla from a particular site (or sites) was preferred. However, the results of these analyses were inconclusive, with no clear pattern evident. This was most likely due to the great variation in the "quality" of hydrilla within a site, and at any particular site over time.

Oviposition and Survival Testing

Our oviposition/survival tests concentrated on four groups of plant species. These groups are: (1) Hydrocharitaceae species; (2) plant species that obtained high feeding scores by HSB weevils; (3) plant species upon which HSB was collected in the field; and (4) plant species that have relatives in the United States.

Methods

We conducted our laboratory no-choice oviposition and survival tests in late 1985 and throughout 1986 at the Brisbane and Townsville laboratories, using our laboratory HSB colonies as well as field-collected weevils. All aquatic plants were collected from field sites on north Queensland, southeast Queensland, and northern New South Wales. Plants not used immediately were held in laboratory tanks or tubs until required.

Oviposition by HSB on hydrilla and survival of resultant immatures were compared with those on rice and 17 aquatic plant species (Table 15). Most of the plants were tested more than once, with the number of tests conducted on each plant species dependent on its availability at our field sites. Some species were rare in the field, and only one test could be conducted for each (i.e. *Elodea canadensis* and *Blyxa aubertii*). Some tests were conducted simultaneously. Although each test took up to one month to complete, we were able to complete 76 tests.

For each of the 76 tests (Appendix I), an oviposition chamber was prepared by lining a plastic container (20 cm by 20 cm by 11 cm deep) with moist paper toweling. We added 15 to 20 g of fresh, test plant material, along with 20 HSB adults (10 male and 10 female) to the chamber, which was then covered with an opaque plastic lid. After 3 days, the adults were removed, and the number dead of each sex was recorded. The plant material was immediately examined under a microscope, and the number of eggs counted. On 14 occasions, we simultaneously tested hydrilla in a duplicate oviposition chamber, using the same procedure.

After the eggs were counted, the test plant material was returned to a development chamber (ex. oviposition chamber) and then searched daily, over 3 to 4 weeks. Fresh plant material was added as necessary, and the humidity in the development chamber was maintained by adding water to the paper toweling. Dead immatures were preserved, and their life stage recorded. When prepupae and pupae appeared on the bottom of the development chamber, they were removed and placed in a petrie dish lined with moist filter paper, or onto moist potting soil in a circular plastic pupation chamber 5 cm in diameter). Since we were not always able to detect every immature (especially on non-hydrilla plants), we continued to monitor the development chamber with the plant material for the occasional adult which emerged there. Newly emerged adults

Table 15
Oviposition and Survival of Immatures of HSB on 19 Aquatic Plant Species

Genus and Species	Number of Tests	Mean Eggs/♀/Day (Range)	Mean % Survival Egg - Adult (Range)
Hydrocharitaceae			
Blyxa aubertii	1	0.43	53.8
Blyxa octandra	3	1.03 (0.73-1.27)	36.4 (21.2-59.1)
Egeria densa	5	1.39 (0.63-2.60)	35.0 (0.0-61.4)
Elodea canadensis	1	1.63	51.0
Hydrilla verticillata	14	2.75 (0.67-5.22)	41.8 (18.5-63.6)
Hydrocharis dubia	3	0	-
Ottelia alismoides	3	1.13 (0.70-1.80)	57.1 (50.0-71.4)
Ottelia ovalifolia	5	0.64 (0.00-1.33)	55.0 (47.1-65.0)
Vallisneria gigantea	2	0.43 (0.33-0.53)	22.5 (20.0-25.0)
Vallisneria ?spiralis	4	1.08 (0.53-1.80)	26.8 (5.6-54.5)
Non-Hydrocharitaceae			
Cabomba caroliniana	2	0	-
Ceratophyllum demersum	3	0.24 (0.00-0.63)	50.0 (0.0-100.0)
Marsilea drummondii	3	0	-
Myriophyllum verrucosum	4	0	-
Najas tenuifolia	4	0.57 (0.33-1.04)	30.5 (8.3-53.6)
Oryza sativa	2	0	-
Potamogeton crispus	3	0.25 (0.00-0.71)	5.9 (0.0-11.8)
Potamogeton perfoliatus	3	0	-
Potamogeton tricarinatus	3	0	-

were counted and preserved daily. Survival was calculated as the percentage of eggs which developed into adults.

Results and discussion

One *E. densa* test was eliminated due to desiccation of the test plant material during the trial, while a further seven tests were eliminated due to incorrect egg counts. Tests eliminated are marked by an asterisk (*) in Appendix I. The pooled results for the 68 tests used in the analysis, for each plant species, are presented in Table 15.

HSB oviposited on hydrilla and 11 plant species, 9 of which were Hydrocharitaceae. These 12 plant species were all considered to be potential hosts, and HSB was considered more likely to oviposit on these than most other plants. The higher mean oviposition rate (2.75 eggs/♀/d) was recorded on hydrilla.

The very high variability in the feeding and oviposition results on hydrilla may be due to plant "quality." "Quality" used in this sense is related to the nutritional value of the plant, as well as the thickness and "hardness" or toughness of the stems. It has been shown that a critical level of nitrogen is required in *Salvinia molesta* before populations of the weevil *Cyrtobagous salviniae* will increase upon it (Room and Thomas 1985). However, the plant appears to remain quite healthy, even when below this nitrogen level (Room and Thomas 1985). During 1986 and 1987, we obtained total nitrogen values for 52 of our hydrilla samples (Table 8), but failed to find a correlation between this factor and results obtained during our feeding and oviposition trials.

Oviposition on the different Hydrocharitaceae species was variable. After hydrilla, the highest oviposition rates were recorded for *Egeria densa* (1.39 eggs/♀/d) and *Elodea canadensis* (1.63 eggs/♀/d). Both plants are submerged Hydrocharitaceae, which resemble hydrilla, having whorls of small leaves, interspaced along thin stems. Oviposition was lower (≤1.13 eggs/♀/d) on the remaining Hydrocharitaceae, which do not resemble hydrilla, having either a ribbon-like appearance (e.g. *Vallisneria* spp. and *Blyxa* spp.) or large, ovate leaf blades with moderately thick petioles (eg. *Ottelia* spp.).

Oviposition on non-Hydrocharitaceae occurred only on three species, and all were at low levels (≤0.57 eggs/♀/d). These plants (*C. demersum, N. tenuifolia,* and *P. crispus*) have similar stem structures to hydrilla. HSB did not oviposit on *C. caroliniana, H. dubia, M ?drummondii, M. verrucosum, P. perfoliatus, P. tricarinatus,* and rice (*Oryza sativa*).

Some immatures were able to complete development on all plant species on which HSB oviposited. The highest mean survival was on *O. alismoides* and *O. ovalifolia*. The mean survival on *B. aubertii, C. demersum,* and *E. canadensis* was also higher than on hydrilla.

To better illustrate the acceptability of each host plant species for HSB, we plotted mean survival of HSB immatures against the mean, pooled oviposition rate (Figure 5) for each aquatic plant species. Plants which displayed similar results were grouped and labeled with a Roman numeral. These numerals also indicate the position of the weighted mean value of each group. Test plants were separated into five groups.

Hydrilla is the only member of group I, which is located in the upper right portion of the graph where the true hosts of HSB should occur. Hydrilla induced high oviposition by HSB females (pooled mean = 2.75 eggs/♀/d), significantly higher than other plant species analyzed—and facilitated moderate survival of immatures (mean = 41.8%). These results compare favorably with our 1985-1989 field surveys where HSB was collected in higher densities on hydrilla than on any other aquatic plant species (Balciunas and Purcell 1991, Balciunas *et al.* in press a).

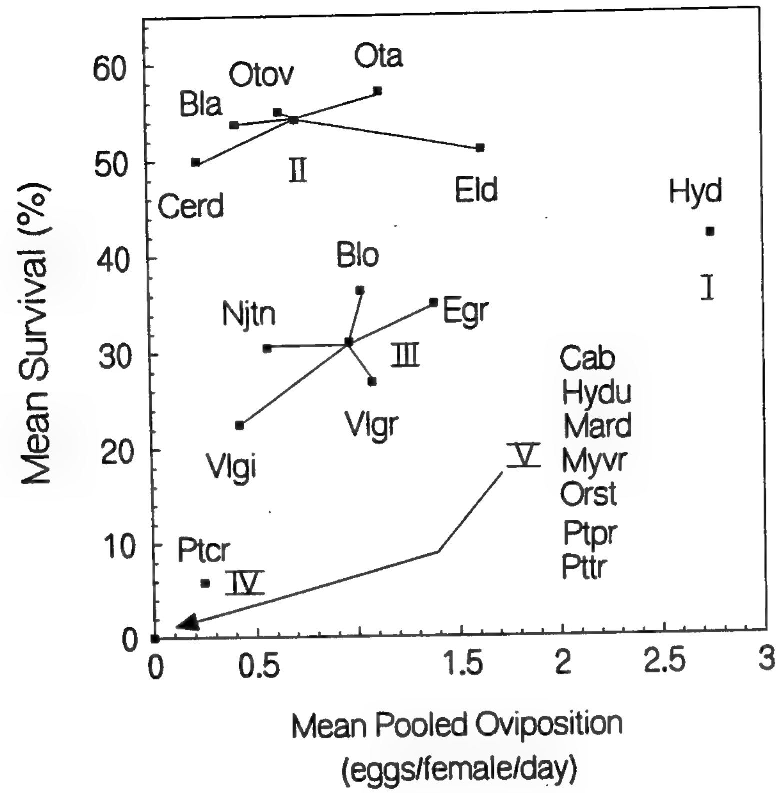

Figure 5. Plot of oviposition and larval survival for the hydrilla stem boring weevil, *Bagous hydrillae,* on 19 aquatic plant species

Group II includes species on which HSB exhibited low to moderate, pooled mean oviposition (0.24-1.63 eggs/♀/d) as well as high mean survival of immatures (50.0 to 57.1%). The 5 species in group II (*C. demersum* and 4 of the Hydrocharitaceae, *B. aubertii, E. canadensis, O. alismoides,* and *O. ovalifolia)* may serve as alternate hosts of HSB. This weevil was occasionally collected in low densities from *C. demersum* and *O. alismoides* in field surveys but was never collected from *B. aubertii, E. canadensis,* or *O. ovalifolia* (Balciunas, Purcell, and Burrows in press a).

Group III contains species which induced low to moderate oviposition (0.43 to 1.39 eggs/♀/d) by HSB, but had less than 37% of eggs develop into adults. These 5 plants (*N. tenuifolia,* and the 4 Hydrocharitaceae species *B. octandra, E. densa, V. gigantea,* and *V. ?spiralis*) may be alternate hosts, but HSB would probably not develop high populations on these species in the field. These results compare favorably with the results of our field surveys, where HSB was collected in low to moderate densities from *N. tenuifolia,* extremely low

densities on *E. densa*, and was never collected from *B. octandra* and *V. gigantea* (Balciunas, Purcell, and Burrows in press a). However, at some dam sites, large numbers of HSB larvae were collected from *V. ?spiralis* (recorded as *V. ?gracilis* in Balciunas and Purcell 1991) which had become stranded due to reductions in water levels.

Potamogeton crispus is the only member of group IV. This plant induced only low oviposition and low survival by HSB. During 3 tests, only 18 eggs were oviposited on this plant, from which only 2 adults developed. In our field surveys, HSB densities were very low on *P. crispus* (Balciunas, Purcell, and Burrows in press a).

Group V consists of the 7 species on which HSB failed to oviposit: *C. caroliniana, H. dubia, M. ?drummondii, M. verrucosum, P. perfoliatus, P. tricarinatus*, and rice (*Oryza sativa*). HSB is unlikely to oviposit on these species in the field, and undoubtedly they would be unsuitable as hosts for HSB. In our field surveys, HSB was not found on 4 of the group V species. Low densities of larvae were collected on *P. perfoliatus* (Balciunas, Purcell, and Burrows in press a) while rice was never surveyed in the field.

In the laboratory, HSB can reproduce on non-target aquatic plants, including species outside the family Hydrocharitaceae. However, for HSB to complete its life cycle on these other species in the field, the larval and/or adult feeding must result in fragmentation of plants to enable larvae to float to shore, where pupation occurs. This fragmentation, which occurs readily on hydrilla (Balciunas and Purcell 1991), is unlikely to occur on aquatic plant species with thicker plant tissue. For example, at some field sites, large numbers of HSB larvae were occasionally collected from submersed *V. ?spiralis*. No windrows of *V. ?spiralis* fragments were present along the shoreline on these occasions, although windrows of hydrilla occurred frequently, following heavy feeding by HSB on that plant (Balciunas and Purcell 1991). It is unlikely that a significant population of HSB could survive on submersed *V. ?spiralis*, because if fragmentation does not occur, larvae will most likely perish within the submersed plant.

The results of these oviposition and survival tests, combined with our field surveys (Balciunas and Purcell 1991), indicate that hydrilla is the true host of HSB. We believe that the unique requirements for HSB to complete its life cycle in the field make this weevil an unlikely threat to other aquatic plant species in the United States.

Predicted Post-Release Safety

Because HSB occasionally used *V. ?spiralis* as an alternate host in Australia, once released in the United States, HSB might feed on *Vallisneria americana* Michx., a desirable native frequently fed on by waterfowl. Under certain unusual circumstances, such as when *V. americana* mats are exposed by

drought or drawdowns, it may be heavily fed on by HSB weevils. For example, collections of hydrilla and *V. ?spiralis* at Lake Borumba in mid-1986 yielded 42 and 845 HSB, respectively. Receding water levels had left the *V. ?spiralis* mats stranded along the shoreline, the habitat favored by HSB for pupation. This *V. ?spiralis* was most likely doomed to desiccation anyway. The hydrilla present at that time was further offshore, and 10 to 20 cm below the surface. While HSB will feed upon submersed *V. ?spiralis*, the stems do not fragment, and the larvae cannot float to the shore to pupate. *Vallisneria* and other aquatic vegetation growing at hydrilla-free sites would most likely remain free of this weevil.

The greatest threat to *Vallisneria* in the United States appears to be displacement by hydrilla. For instance, between 1978 and 1980, at the Wacissa River in northern Florida, the senior author observed vast mats of *V. americana*, hundreds of meters in length, that were replaced by invading hydrilla. The most likely outcome of high HSB populations in the United States will be that, even though HSB occasionally feeds on *Vallisneria*, population levels of *V. americana* will increase as the heavily attacked hydrilla loses its competitive advantage.

Status of HSB in Florida

Since being released in the field in March 1991, HSB has not yet conclusively established in the field (Center 1992). However, the senior author collected two adult weevils at one site in south Florida (Lake Osborne, Palm Beach County), 70 days after releases were made there (Center 1992). These weevils were considered to be F1 progeny of the original release weevils (Center 1992).

7 *Hydrellia balciunasi* Bock (Diptera: Ephydridae)

Introduction

Early in this project, we discovered a fly belonging to the genus *Hydrellia* feeding upon hydrilla at many of our sites. As another member of this genus, *H. pakistanae*, was at that time being evaluated in Florida quarantine as a biocontrol agent for hydrilla, we were very interested in the biocontrol potential of this new species. It was hoped that the flies from Australia, being from a more temperate environment, would be more cold-hardy than *H. pakistanae* (Buckingham 1988). Quarantine studies confirmed our field survey results, showing that this fly, now formally described as *Hydrellia balciunasi* Bock (Figure 6) (Bock 1990), was highly specific. The first field releases of *H. balciunasi* were made in Florida in August 1989 (Center 1992).

Taxonomy

In June 1985, Dr. Don Colless from CSIRO's Division of Entomology in Canberra keyed out most of our field-collected Ephydridae specimens to be *Hydrellia unigena* Cresson, a well-known Australian species. As these specimens had come from several different host species (including *C. demersum, L. peploides, M. ?drummondii, M. verrucosum, N. tenuifolia, P. javanicus*, and *V. ?spiralis*), it was considered that this species would not be suitable as a biocontrol agent. Just several weeks after that, we received word that Dr. Ian Bock of La Trobe University in Victoria was reviewing the taxonomy of Australian Ephydridae, in particular, *Hydrellia* spp. By September 1985, he had determined that although we had collected some specimens of *H. unigena*, most of our specimens were new sibling species that closely resembles *H. unigena*. In adults of *H. unigena*, the ratio of the second and third costal sections in the wing is about 1:6, but in this new sibling species (*H. balciunasi*), is about 1:1 (Bock 1990).

In April 1987, Dr. Bock received the holotypes of *H. unigena* from the Academy of Natural Sciences of Philadelphia and confirmed that our

Figure 6. Photo of the adult of the hydrilla leaf-mining fly, *Hydrellia balciunasi*, the second Australian biological control agent for hydrilla exported to the United States

specimens were different from this species. At this stage, our specimens were under consideration to be called of *H. ceramensis* de Meijere. In February of 1988, Dr. Bock received the type specimens of *H. ceramensis* from Amsterdam, and quickly confirmed that our species was different. Examination by Dr. Bock of *H. pakistanae* Deonier, sent to him from Florida (by Dr. Gary Buckingham) in early 1988, confirmed, by dissection of genitalia, that our Australian species was new and undescribed. The published description of *H. balciunasi* Bock also included descriptions of the other 14 species of *Hydrellia* that are now known from Australia (Bock 1990).

Field Site Data

The occurrence of *H. balciunasi* at our field sites is shown in Tables 16 and 17. The maximum density of *H. balciunasi* was 671/kg on hydrilla at Ingham Botanical Gardens (QLD88z218). Other high densities in NQ have occurred on hydrilla in samples taken from Somerset Dam (484/kg-SQL86z244), Alice River (419/kg-QLD85z244 and 418/kg-QLD87z230), and Bohle River Site #2 (389/kg-QLD90z211). Densities of *H. balciunasi* greater than 100/kg have been recorded 31 times at 7 sites in NQ, and 9 times at 6 sites in SQ/NSW. The highest density of a non-hydrilla host was 75/kg on *P. javanicus* (QLD87z402). Our most consistent NQ sites were Bohle River, Alice River, Ingham Botanical Gardens, and Keelbottom Billabong, where *H. balciunasi* was found in over 50% of collections, and often in high densities. These sites are characterized by clear, shallow water with hydrilla populations that are often topping out, thus facilitating oviposition

Table 16
Sites of North Queensland Quantitative Collections with *Hydrellia balciunasi*

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi*/kg of hydrilla	Max *H. balciunasi*/kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Alice River	60	96	75.0	39.6	4,828	203	949	156	83.1	419.6
Avondale Creek	0	12	0.0	8.3	0	0	0	3	0.0	8.6[1]
Barron River	2	0	100.0	0.0	80	0	6	0	60.8	113.3
Bohle River #1	4	1	75.0	0.0	.6	0	9	0	4.4	8.6
Bohle River #2	19	11	78.9	0.0	3,403	0	310	0	98.5	389.1
Borrow Pits #1, #2	30	30	50.0	16.7	89	12	12	3	2.7	20.8
Cattle Creek	5	37	80.0	8.1	16	1	9	10	12.4	37.0
Centenary Lakes	22	34	77.3	8.8	664	1	170	2	45.2	105.0
Fogg Dam[2]	4	4	50.0	0.0	37	0	19	0	41.2	66.7
Freshwater Creek	37	66	24.3	13.6	13	9	5	5	0.6	85.7

(Sheet 1 of 3)

[1] Recorded on *Cabomba caroliniana.*
[2] Northern Territory site.
[3] Recorded on *Blyxa octandra.*
[4] Recorded on *Najas tenuifolia.*
[5] Recorded on *Potamogeton tricarinatus.*

Table 16 (Continued)

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi*/kg of hydrilla	Max *H. balciunasi*/kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Garbutt Park Stream	2	0	100.0	0.0	2	0	1	0	1.5	2.9
Goosepond Creek	4	7	50.0	14.3	112	1	11	0	29.9	170.0
Harvey Creek Overflow	0	48	0.0	2.1	0	0	0	1	0.0	2.9[3]
Ingham Botanical Gardens	21	20	85.7	35.0	520	13	129	8	35.0	671.4
Keelbottom Billabong	21	13	76.2	15.4	418	0	67	2	17.0	162.9
Keelbottom Creek	11	17	54.5	29.4	36	28	19	3	7.7	97.1
Lake Moondarra	2	0	50.0	0.0	13	0	3	0	5.5	14.7
Leichhardt Creek	1	8	0.0	12.5	0	0	0	1	2.8	4.4[4]
Louisa Creek	8	29	37.5	0.0	9	0	12	0	3.1	34.3
Martins Creek	2	3	100.0	0.0	30	0	3	0	14.4	15.1
Quinns Pond	1	1	100.0	0.0	1	0	3	0	5.7	5.7

(Sheet 2 of 3)

Table 16 (Concluded)

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi*/kg of hydrilla	Max *H. balciunasi*/kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Ross River	3	6	66.7	16.7	34	8	16	0	18.1	48.5
Ross River Bridge	6	18	33.3	16.7	2	7	0	0	0.4	5.73[5]
Ross River Dam	53	143	35.8	9.8	277	12	118	10	8.7	95.6
Stone River	0	2	0.0	50.0	0	3	0	1	0.0	11.4[5]
Stuart Creek	7	17	42.9	11.8	44	0	7	2	14.6	122.9
Whitfield Creek	0	10	0.0	10.0	0	2	0	2	0.0	11.4[3]
19 other sites	16	35	0.0	0.0	0	0	0	0	0.0	0.0
	341	668	55.1	14.7	10,634	300	1,878	209	37.9	671.4

(Sheet 3 of 3)

Table 17
Sites of South Queensland and New South Wales Quantitative Collections with *Hydrellia balciunasi*

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi* / kg of hydrilla	Max *H. balciunasi* / kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Alipou Creek[1]	9	6	88.9	0.0	229	0	225	0	30.1	120.8
Atkinsons Dam	10	3	30.0	0.0	6	0	4	0	0.7	3.3
Byron Bay Golf Course[1]	1	0	100.0	0.0	13	0	14	0	41.9	41.9
Canungra Creek	5	5	80.0	40.0	13	13	3	0	2.1	6.0
Carrs Creek[1]	4	30	50.0	0.0	5	1	7	0	2.7	35.4
Coles Creek	2	0	50.0	0.0	20	0	0	0	5.8	13.1
Colleyville Floodway	1	0	100.0	0.0	1	0	0	0	0.7	0.7
Coonoon Creek	10	3	60.0	33.3	450	1	74	0	36.8	321.4
Currumbin Creek	6	0	33.3	0.0	48	0	99	0	16.2	79.0
Enoggera Reservoir	6	4	100.0	0.0	121	0	36	0	17.4	45.2

(Sheet 1 of 3)

[1] NSW sites.
[2] Recorded on *Potamogeton crispus*.

Table 17 (Continued)

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi* / kg of hydrilla	Max *H. balciunasi*/ kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Gold Creek	1	20	100.0	0.0	13	0	14	0	21.9	21.9
Grafton Boat Club[1]	3	24	33.3	8.3	2	1	1	1	0.9	5.2
Hinze Dam	2	0	50.0	0.0	1	0	0	0	0.3	0.7
Hinze Dam Spillway	1	0	100.0	0.0	7	0	12	0	12.4	12.4
Lake Borumba	31	54	48.4	0.0	36	0	35	0	1.6	7.6
Lismore Ski Lake[1]	5	0	20.0	0.0	5	0	0	0	0.8	3.8
Macleay River[1]	1	2	100.0	0.0	3	0	0	0	12.3	12.4
Maroon Dam	12	4	50.0	50.0	7	10	6	0	0.7	6.0[2]
Mary River North	4	0	50.0	0.0	16	0	18	0	7.2	19.1
Mary River-Conondale	22	17	59.1	0.0	195	0	51	0	8.0	49.7
Moogerah Dam	20	4	35.0	0.0	13	0	26	0	1.2	14.1
North Pine Dam	29	21	79.3	0.0	661	0	509	0	27.6	164.2

(Sheet 2 of 3)

Table 17 (Concluded)

Site Name	Collections		% With *H. balciunasi*		*H. balciunasi* Larvae		*H. balciunasi* Adults		Mean *H. balciunasi* / kg of hydrilla	Max *H. balciunasi*/ kg of hydrilla
	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla	Hydrilla	Non-hydrilla		
Petrie Park	13	5	84.6	0.0	578	0	350	0	49.7	225.0
Qld. Agricultural College	6	2	66.7	0.0	323	0	136	0	60.7	215.8
St. Lucia Golf Club	1	0	100.0	0.0	1	0	1	0	1.3	1.3
Somerset Dam	23	20	47.8	0.0	830	0	218	0	28.9	484.0
Yabba Creek North	1	2	100.0	0.0	2	0	3	0	3.1	3.1
Yabba Creek-Imbil	9	19	66.7	0.0	59	0	44	0	8.9	26.4
20 other sites	8	95	0.0	0.0	0	0	0	0	0.0	0.0
	246	340	56.9	2.4	3,657	27	1,886	1	16.1	484.0

(Sheet 3 of 3)

by *H. balciunasi* females. Alice River and Bohle River are both within 25 min drive from the Townsville laboratory and were regularly sampled. All of the *H. balciunasi* sent to Gainesville quarantine from NQ were collected from these two sites. The best SQ sites were North Pine Dam, Somerset Dam, Petrie Park, and Coonoon Creek (Table 17).

Hydrellia balciunasi was nearly two-and-a-half times more abundant in our collections (on a per kg basis) in NQ/NT than it was in SQ/NSW. However, this result may not be a true reflection of field abundance due to differences in collection site conditions in the two regions, and the different berlese sizes used by the Townsville and Brisbane laboratories. In SQ/NSW, many of our collection sites were reservoirs, whereas most of the NQ/NT sites were creeks and rivers that had large seasonal variations in water flow. At the reservoir sites in SQ/NSW, collections were often made of plant material stranded near the shoreline, as this was the best way of collecting HSB weevils (see Chapter 6). Plant material was rarely stranded at our NQ/NT sites, and virtually all collections there were of attached plants in rivers and creeks.

The larger and hotter funnels used in the Brisbane laboratory may have increased mortality of larvae (both *H. balciunasi* and HSB) within the berleses. Thus the abundance of *H. balciunasi* in SQ/NSW may be underestimated compared to NQ/NT. Supporting evidence can be found in the relative proportions of *H. balciunasi* adults and larvae collected from berleses. In NQ/NT, 84% of *H. balciunasi* were collected as larvae, while for SQ/NSW, this figure is only 66%. The number of *H. balciunasi* adults collected in SQ/NSW was only 10% less than the number collected in NQ/NT, but for larvae, the number collected in SQ/NSW was nearly 67% less than in NQ/NT.

Field Host-Specificity

The field hosts of *H. balciunasi* in our quantitative collections are shown in Tables 18 (NQ/NT) and 19 (SQ/NSW). In NQ/NT, *H. balciunasi* was found in 188 of 341 (55%) hydrilla collections, and 101 of 668 (15%) collections of 39 other aquatic plant species. In NQ/NT, 13,084 specimens were collected, with 12,512 (95.6%) of these collected on hydrilla at an average of 37.85/kg, while the remaining 572 (4.4%) specimens were collected on 20 other aquatic plant species at an average of 1.68/kg.

In SQ/NSW, *H. balciunasi* was found in 140 of 247 (57%) of hydrilla collections, and only 8 of 339 (2%) collections on 23 other aquatic plant species. In this region, 5,571 specimens were collected, with 5,543 (99.5%) of these collected on hydrilla at an average of 16.11/kg, and the remaining 28 (0.5%) specimens were collected on 3 other aquatic plant species at an average of 0.14/kg.

Table 18
Plant Species Upon Which *Hydrellia balciunasi* Was Collected in North Queensland and Northern Territory

Plant Species	Total No. Sites	% with *H. balciunasi*	Total No. Coll.	% with *H. balciunasi*	Larvae	Adults	*H. balciunasi*/ kg	Max *H. balciunasi*/ kg
Hydrocharitaceae								
Blyxa octandra	8	37.5	73	8.2	6	4	0.24	11.4
Hydrilla verticillata	35	65.7	341	55.1	10,634	1,878	37.85	671.4
Vallisneria ?spiralis	10	30.0	86	18.6	83	12	1.46	8.5
Non-Hydrocharitaceae								
Ceratophyllum demersum	11	45.5	112	16.1	60	26	1.23	13.6
Chara sp.	5	40.0	10	30.0	1	3	0.85	2.9
Ipomoea aquatica	1	100.0	13	30.8	4	2	0.56	3.8
Ludwigia peploides	3	33.3	16	12.5	1	1	0.26	2.9
Marsilea ?drummonii	6	16.7	35	25.7	20	8	2.12	47.4
Myriophyllum verrucosum	5	20.0	8	12.5	1	0	0.29	3.3
Najas tenuifolia	15	26.7	67	25.4	125	125	6.09	54.5
Nymphoides indica	10	60.0	55	10.9	18	3	0.61	9.0
Polygonum ?decipiens	1	100.0	3	33.3	1	0	0.98	3.2
Potamogeton javanicus	3	33.3	13	23.1	27	2	5.09	74.6
Potamogeton tricarinatus	7	57.1	34	20.6	15	5	1.40	11.4
Species Upon Which Adults But No Larvae Were Found								
Hydrocharitaceae								
Ottelia alismoides	1	100.0	5	20.0	0	1	0.41	2.9
Non-Hydrocharitaceae								
Azolla ?pinnata	4	25.0	11	9.1	0	3	0.71	5.0
Cabomba caroliniana	1	100.0	5	20.0	0	3	1.20	8.6
Cyperus sp.	1	100.0	1	100.0	0	1	2.86	2.9
Lemna sp.	2	50.0	2	50.0	0	1	1.72	3.6
Nymphaea gigantea	9	11.1	28	3.6	0	1	0.09	1.3
Utricularia sp.	4	25.0	17	11.8	0	9	1.33	22.9
20 other species	16	0.0	74	0.0	0	0	0.0	0.0
	46	58.7	1,009	28.6	10,996	2,088	18.39	671.4

Table 19
Plant Species Upon Which *Hydrellia balciunasi* Was Collected in South Queensland and New South Wales

Plant Species	Total No. Sites	% with *H. balciunasi*	Total No. Coll.	% with *H. balciunasi*	Larvae	Adults	*H. balciunasi*/ kg	Max *H. balciunasi*/ kg
Hydrocharitaceae								
Egeria densa	10	10.0	121	1.6	2	1	0.02	1.2
Hydrilla verticillata	35	74.3	247	56.7	3,657	1,886	16.11	484.0
Non-Hydrocharitaceae								
Potamogeton crispus	8	37.5	18	22.2	15	0	0.65	6.0
Potamogeton perfoliatus	7	28.6	15	13.3	10	0	0.61	6.0
19 other species	26	0.0	185	0.0	0	0	0.0	0.0
	48	58.3	586	25.3	3,684	1,887	7.07	484.0

Although *H. balciunasi* was collected on 20 aquatic plant species (out of 39 sampled) besides hydrilla in NQ/NT, but only on 3 aquatic plant species (out of 23 sampled) besides hydrilla in SQ/NSW, does not necessarily mean that *H. balciunasi* is more field host-specific in SQ/NSW than in NQ/NT. The possible increased mortality of *H. balciunasi* larvae within Brisbane laboratory berleses may also have reduced the apparent field host-specificity in SQ/NSW for collections where low numbers of *H. balciunasi* were present, but died within the berlese and were therefore not recorded. This result could also be partly due to a greater number of plant species available within any one creek of NQ. A high abundance of larvae may cause overcrowding, and force some larvae to move to adjacent plant species. Often in NQ, we collected samples of plant species containing just a few specimens of *H. balciunasi*, while simultaneous samples of hydrilla at the same site have produced very high numbers of *H. balciunasi* larvae. *Hydrellia balciunasi* is probably more host-specific in NQ/NT than it appears in our data. In NQ/NT, 10 of the 20 non-hydrilla plant species had 4 or less *H. balciunasi* collected from them, and for 7 species, *H. balciunasi* were only collected as adults. The occurrence of *H. balciunasi* on these species may be adventitious.

Tables 16 and 17 show the host-specificity of *H. balciunasi* at each site where it was collected. Significant numbers of *H. balciunasi* were only collected from non-hydrilla hosts at Alice River, where numerous aquatic plant species were available in proximity to hydrilla. Despite this, 94.2% (5,777 out of 6,136) of the *H. balciunasi* collected at this site was found on hydrilla.

In summary, although *H. balciunasi* was collected on 23 other plant species besides hydrilla, these collections provided only 3.2% of the specimens. The other 96.8% of specimens were found in 328 out of 588 (56%) collections of

hydrilla. Thus, our surveys indicate a high degree of field host-specificity for *H. balciunasi*.

Laboratory Study and Life History

Our Australian studies of *H. balciunasi* were mainly limited to our field collections, with only minimal laboratory studies. There were two reasons for this. The first was that many species within this genus are known to have a narrow host plant range (Deonier 1971). The second reason was that a closely related species, *H. pakistanae*, had already been evaluated in India and Pakistan as a potential biocontrol agent for hydrilla (see Baloch, Sana-Ullah, and Ghani 1980). After importation into Gainesville quarantine in 1985, *H. pakistanae* proved to have a sufficiently narrow host range (Buckingham, Okrah, and Thomas 1989) to warrant its field release in Florida in October 1987 (Buckingham 1988). These factors, coupled with a reasonably high degree of field host-specificity, as indicated in our field collections, led to *H. balciunasi* being exported to Gainesville quarantine in January 1988. Delays at a USA airport caused the death of these flies, and a second shipment was the following month. Previous experience with the handling, rearing, and testing of *H. pakistanae* enabled a rapid quarantine evaluation of *H. balciunasi*, and it was released on 24 May 1989 (Buckingham, Okrah, and Christian-Meier 1991).

Buckingham, Okrah, and Christian-Meier (1991) have described the laboratory life history of *H. balciunasi*. Development time from egg to adult was approximately 22 days. Females lay eggs on the leaves or stems of hydrilla at, or mostly above, the water surface. The larvae emerge and wander before entering the leaves, usually through the upper surface. A single larva will mine the leaf completely before moving to another in the same whorl, or on a different whorl. *Hydrellia balciunasi* larvae develop through three instars before forming puparia inside leaf axils. When the adults emerge, they rise in a bubble of air to the water surface. The development time from newly laid egg to adult (at 27 °C) is approximately 23 days.

Colonies

Laboratory colonies of *H. balciunasi* were maintained in rearing/oviposition chambers. Each chamber was prepared by adding water (depth 2 cm) to an opaque plastic container, and sufficient hydrilla was added to cover the bottom. Field collected *H. balciunasi* adults and larvae were released into each chamber, and adults were supplied with a yeast extract and a honey solution as food sources. Each chamber was covered with a gauze lid. Adults were removed with an aspirator after 2 to 3 days, then released into a fresh chamber. The initial chamber was set aside to allow the eggs and larvae to develop. Newly emerged adults were removed and released into another chamber to start a new

generation. Field-collected larvae were frequently contaminated by micro-Hymenoptera parasites.

Field Releases in the United States

After its successful evaluation in quarantine (Buckingham, Okrah, and Christian-Meier 1991), *H. balciunasi* was released at five sites in Florida, starting in August 1989 (Center 1992). Although initially assumed to have established at its first release site in Florida (a small pond at the Orangebrook County Club in Broward County, Florida), this population was soon overrun by *H. pakistanae* (Center 1992). It was discovered that the laboratory colonies from which releases were being made had also become overrun by *H. pakistanae* (Center 1992). *Hydrellia pakistanae* had already established at many sites in Florida and was dispersing naturally (Center 1992), thus making release and establishment of *H. balciunasi* in Florida difficult. At one site in Texas 20,000 *H. balciunasi* were released between August and November 1991, and establishment is believed to be occurring (Grodowitz and Snoddy 1992).

8 Aquatic Moths (Lepidoptera:Pyralidae)

Introduction

A variety of aquatic moth larvae were collected from many different aquatic plant species at most sites in NQ and at some of the sites in SQ and NSW. The most promising of these were three species collected in flowing streams in northern Queensland. Late in 1989, we received permission to send these three moth species (*A. siennata*, *N. eromenalis*, and *S. repititalis*) to quarantine facilities in the United States, but subsequent collecting trips failed to collect enough specimens. Termination of funding, coupled with a lack of quarantine space, then negated any further attempts to study or ship these moth species. (See Figures 7 and 8.)

In May 1992, Dr. Dale Habeck (University of Florida) came to Australia for a 5-month study of these aquatic months. Dr. Habeck based himself at the Queensland Department of Primary Industries station in Mareeba, a 1-hr drive west of Cairns. At the end of this period, several thousand eggs of two of these moth species, *A. siennata* and *N. eromenalis*, were shipped to the Gainesville quarantine facility in Florida for further evaluation. At the end of 1992, adults had been reared from the eggs of both moth species and the adults of *A. siennata* had oviposited a new generation of eggs.[1]

Taxonomy

Moth specimens collected during this project were identified by Mr. E. D. Edwards of CSIRO Division of Entomology in Canberra. Table 20 lists all the moth species we collected, along with their hosts. The first column of this table shows the names given to our moths when they were identified. The second column shows what their new name will likely be in the forthcoming Catalogue of Australian Lepidoptera (Nielson, Edwards, and Rangsi, in press).

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1 Personal Communication. D. H. Habeck.

Figure 7. Photo of the adult of *Aulacodes siennata*, currently undergoing quarantine research to determine its safety for release as a biological control agent of hydrilla

Figure 8. Photo of the adult to *Nymphula eromenalis*, currently undergoing quarantine research to determine its safety for release as a biological control agent of hydrilla

Table 20
Aquatic Moths (Pyralidae) Collected During the Project and Their Hosts

Current Name	Name in Forthcoming Checklist	Host Collect from
Araeomorpha nr. atmota Turner	*Araeomorpha nr. atmota* Turner	Azo
Aulacodes siennata Warren	*Theila siennata* (Warren)	Hyd
Nymphula crisonalis Walker	*Parapoynx crisonalis* (Walker)	Blacklight-NT
Nymphula dicentra Meyrick	*Parapoynx diminutalis* Snellen	Hyd,Ptjv,Pttr,Naj
Nymphula eromenalis Snellen	*Ambia ptolycusalis* (Walker)	Hyd
Nymphula nitens Butler	*Hygraula nitens* (Butler)	Hyd
Nymphula polydectalis Walker	*Parapoynx polydectalis* (Walker)	Ptjv,Bloc
Nymphula prob. *responsalis* (Walker)	*Elophila responsalis* (Walker)	Blacklight-Cairns
Nymphula stagnalis Zellar	*Parapoynx stagnalis* (Zeller)	Ptjv
Nymphula tenebrialis Butler	*Parapoynx tenebralis* (Lower)	Ndin
Nymphula turbata	?	Mar,Ldpp. Utr
Strepsinoma repititalis (Walker)	*Margarosticha repetitalis* (Warren)	Hyd

The forthcoming catalogue will not list any *Nymphula* species.[1] Prior to this revision, most aquatic moths in Australia were placed in this genus. The Australian National Insect Collection in Canberra houses the type specimens for many Australian species of *Nymphula*. According to Common (1990), there are 14 described species of *Nymphula* in Australia, but it now appears that they will all be reassigned to other genera. Until the new catalogue is published, we will continue to use the old names.

One of the most common moths on hydrilla in Australia were the larvae of what was identified as *Nymphula dicentra*. Because these larvae had numerous gills on the thorax and abdomen, unlike *Nymphula* (sensu strictu), we began referring to them as *Parapoynx dicentra*. These larvae were found feeding on other plants and seemed not to be host-specific. The new checklist will synonomize *P. dicentra* with *P. diminutalis*, the same species that occurs on hydrilla in Southeast Asia, and which was accidentally introduced into Florida in the mid-1970's (Del Fosse, Perkins, and Steward 1976), and has rapidly spread throughout Florida (Balciunas and Habeck 1981). Since 1986, we have strongly believed that this species would turn out to be *P. diminutalis*, and as it already occurred in the United States, it was not tested.

The larvae of *N. eromenalis* (plus others) were first successfully reared in early 1986. This species was originally thought to lack host-specificity, but

[1] Personal Communication. E. S. Nielson.

rearing of these larvae to adults revealed that three species were actually represented: *N. eromenalis*, *A. siennata*, and *S. repititalis*. All three species are nearly twice as large (and destructive) as *P. dicentra* (soon to be *P. diminutalis*). Further studies indicated that *A. siennata* and *N. eromenalis* preferred hydrilla. These two species are stream-dwellers that we primarily collected from flowing water in the Cairns-Daintree region. This made them difficult to study, particularly under laboratory conditions. Their preference for flowing streams would make *A. siennata* and *N. eromenalis* good biocontrol agents in spring-fed rivers in Florida and Texas, where the agents currently introduced against hydrilla may only have limited impact.

Museum Records

Table 21 summarizes the distribution data from the specimens of *A. siennata* at the ANIC (as of 1987). These specimens come from 41 collections at 31 sites in NQ and from 4 collections from 4 sites in NT. Curiously, there is a single record of *A. siennata* from Yeppoon (150°45'S), which is approximately 580 km SE of Townsville, while the type specimen of this species was apparently collected in Mackay (21°09'S),[1] which is approximately 320 km SE of Townsville. Apart from these two records, the most southerly records are from 20 and 25 miles west of Tully (17°56'S), which is approximately 180 km NNW of Townsville. The most southerly site where we collected *A. siennata* was Whitfield Creek, approximately 150 km N of Townsville.

ANIC museum specimens (Table 22) of *N. eromenalis* range from Cooktown (15°28'S), approximately 460 km NNE of Townsville, to Ingham (18°39'S), approximately 100 km NE of Townsville. Apparently, this species also occurs in Java and the Celebes.[1] Our most southerly collections of *N. eromenalis* were at Double Barrel Creek, approximately 140 km N of Townsville.

Field Distribution and Host-Specificity

Moth larvae were generally less abundant in SQ/NSW collections than in NQ/NT collections, and only limited investigations of their host-specificity and biocontrol potential were performed. Almost 40% of the aquatic moth larvae collected in SQ/NSW were from Maroon Dam. Many of the larvae from this site were collected on *P. crispus*, including 540 from one collection alone (SQL85z407). Although these larvae were not identified, they may have been *N. nitens*. This species occurs in this area and is known to feed on *P. crispus* (Common 1990). This same species was also collected at Maroon Dam from hydrilla that was mixed with *P. crispus*.

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1 Personal Communication. E. D. Edwards.

Table 21
Collection Records of *Aulacodes siennata* Warren Held at the Australian National Insect Collection in Canberra

Collected from	Date of Collection
Queensland	
1.6 km north of Kuranda	22 April 1969
Iron Range	14 April 1964 21 December 1964
Mareeba	13 January 1963
4.8 km west of Mossman	14 March 1964
40 km west of Tully	8 March 1964
Yeppoon (Byfield)	23 October 1924
Lake Barrine	18 June 1939 October 1909 September 1909
Kuranda	11 June 1924
The Intake, Redlynch, Cairns	8 October 1967 30 November 1967
Mossman Gorge (9,144 m)	31 October 1966
6.4 km west of Babinda	10 March 1964 17 April 1964
4.8 km west of Mossman	14 March 1964
32 km west of Tully	20 April 1964 9 June 1936
Malanda	5 December 1967
Babinda	16 September 1930
Isabella Creek 15°18'S, 145°00'E 32 km northwest by west of Cooktown	22 May 1977
Moses Creek 15°42'S, 145°17'E 4 km northeast Mount Finnigan	14 October 1980 15 October 1980
3 km northeast of Mount Webb, Cooktown 15°03'S, 145°09'E	2 October 1980 17 October 1980
5 km south by west Rounded Hill, Cooktown 15°20'S, 145°13'E	7 October 1980
Mount Webb National Park 15°04'S, 145°07'E	30 September 1980
Shiptown Flat near Cooktown 15°47'S, 145°14'E	17 October 1980
29 km northwest by north of Cooktown 15°5'S, 145°06'E	18 May 1977
3 km northeast by north of Julattea	26 September 1980
McIvor River Crossing, 40 km north of Cooktown	15-18 July 1976

(Continued)

Table 21 (Concluded)	
Collected from	**Date of Collection**
Queensland (Continued)	
Edmonton	8 August 1971 23 August 1971 8 September 1971
Cape York, Iron Range	15-20 April 1977
Kuranda	16-30 April 1965
Malanda	8 May 1976
Mowbray River	10 May 1974
Base Cableway, Mount Bellenden-Kerr 17°16'S, 145°54'E	18 October 1981 23 October 1981
Russell River, Palm Swamp 17°16'S, 145°56'E	30 October 1981
Northern Territory	
Stapleton Creek, 7 km north of Adelaide River	12 June 1973
Baroalba Creek Springs, 19 km northeast of East Mount Cahill 12°47'S, 132°51'E	28 October 1972
Birraduk Creek, 18 km northeast of Oenpelli 12°17'S, 133°13'E	1 June 1973
Cooper Creek, 11 km southwest Nimbuwah Road 12°17'S, 133°20'E	3 June 1973

Data presented in Table 23 show that in our NQ field collections both *A. siennata* and *N. eromenalis* were predominantly collected from hydrilla. *Nymphula eromenalis* appears to have a narrow host range, with 85% (1,152 out of 1,349) of the specimens collected on hydrilla. The host range of *A. siennata* was less restricted, with 72% (379 out of 529) of the specimens collected on hydrilla, while a further 25% (132 out of 529) were collected on two other Hydrocharitaceae, *V. ?spiralis* and *B. octandra*. The majority of *S. repititalis* specimens (85% or 795 out of 933) were collected on *B. octandra* and *V. ?spiralis*. Table 24 clearly shows that Freshwater Creek was the most productive site for collection of these three moth species with 84% (2,361 out of 2,804) of specimens collected at this site.

Laboratory Studies and Colonies

Moth larvae were placed individually into small cups with a sprig of host plant and a small amount (<1 cm) of water. Fresh water and host plant were supplied daily. When larvae pupated, the pupal case was placed onto moist paper to prevent the adult from drowning, while still keeping the pupae moist. Most of the larvae that we collected webbed leaves, or parts of leaves, together to form a portable case from within which they fed on other plant tissue. The

Table 22
Collection Records of *Nymphula eromenalis* Snellen Held at the Australian National Insect Collection in Canberra

Collected from Queensland	Date of Collection
Jardine River	10 October 1919 16 October 1919
Cooktown	29 February 1920 1922
37 km west of Cooktown	25 December 1970 17 January 1976
Cairns	?
Kuranda	October 1900 February 1904 12 May 1922 29 August 1929 July 1904 November 1904
1.6 km north of Kuranda	22 April 1969
North side of Lake Tinaroo	9 November 1966 (At light)
Malanda (7,620 m)	5 December 1967
32 km south Ravenshoe (6,705 m)	21 March 1964
Innisfail	Nov?
32 km west of Tully	20 April 1964
Russell River, Palm Swamp 17°16'S, 145 °56'E	30 October 1981
3 km northeast of Mount Tip Tree (760 m) 17°02'S, 145°37'E	20 October 1980
Ingham	3-4 May 1961 (Light trap)

larvae also pupated within these cases. *Aulacodes siennata* and *S. repititalis* do not make portable cases but do utilize shelters made out of silk and plant parts. These larvae were difficult to rear in the laboratory, and despite various changes in our rearing procedures, our success rate only improved marginally, and adults were reared from less than 10% of the larvae that we attempted to rear. Late instar larvae and pupae appeared to be dying from a disease, possibly a microsporidian pathogen such as *Nosema* sp.

During 1988, attempts were made at our Brisbane laboratory to colonize the three stream-dwelling aquatic moth species. We collected hydrilla at Fresh-water Creek and sent the plants by air freight to Brisbane where the moth larvae were extracted. The larvae of each species were then placed into separate breeding cages filled with 5 to 10 cm of water and fresh hydrilla. The top of each cage was enclosed by a frame that supported fine mesh. A piece of grease-proof paper, with a smear of honey solution, was hung from

Table 23
Field Hosts of Three Species of Stream-Dwelling Moths (Lepidoptera: Pyralidae) in NQ

Plant Species	*Aulacodes siennata*			*Nymphula eromenalis*			*Strepsinoma repititalis*		
	No. Larvae	No. Coll.	Larvae/kg	No. Larvae	No. Coll.	Larvae/kg	No. Larvae	No. Coll.	Larvae/kg
Hydrocharitaceae									
Blyxa octandra	55	17	4.9	58	20	5.7	458	29	24.0
Hydrilla verticillata	379	25	18.4	1,152	29	51.9	135	16	11.0
Vallisneria ?spiralis	77	22	4.0	138	25	6.2	337	25	15.4
Non-Hydrocharitaceae									
Cabomba caroliniana	0	0	0.0	0	0	0.0	1	1	2.9
Myriophyllum trachycarpum	18	1	51.4	1	1	1.0	1	1	1.0
Potamogeton javanicus	0	0	0.0	0	0	0.0	1	1	1.4
	529	65	10.2	1,349	75	24.2	933	73	16.9

Table 24
Sites Where Three Species of Stream-Dwelling Moths (Lepidoptera: Pyralidae) Were Collected[1]

Site Name	(Host Plant)	*Aulocodes siennata*			*Nymphula eromenalis*			*Strepsinoma repititalis*			Total		
		Total Larvae	Coll With Larvae	% With Larvae	Total Larvae	Coll With Larvae	% With Larvae	Total Larvae	Coll With Larvae	% With Larvae	Total Larvae	Coll With Larvae	% With Larvae
Avondale Creek	(Cab)	0	0	0.0	0	0	0.0	1	1	20.0	1	1	20.0
Centenary Lake	(Hyd)	0	0	0.0	5	1	4.5	0	0	0.0	5	1	4.5
Daintree River	(Hyd)	0	0	0.0	1	1	50.0	0	0	0.0	1	1	50.0
Double Barrel Creek	(Bloc)	11	4	44.4	8	3	33.3	174	7	77.8	193	7	77.7
Freshwater Creek	(Bloc)	26	7	29.2	46	14	58.3	102	10	41.7	174	16	66.7
	(Hyd)	369	23	62.2	1,139	25	67.6	135	16	43.2	1,643	26	70.3
	(Vl?sp)	74	22	55.0	138	25	62.5	332	25	62.5	544	30	75.0
Harvey Creek Overflow	(Bloc)	11	3	11.5	2	2	7.7	90	9	34.6	103	11	42.3
	(Mytr)	18	1	5.0	1	1	5.0	1	1	5.0	20	2	10.0
	(Ptjv)	0	0	0.0	0	0	0.0	1	1	50.0	1	1	50.0
Martins Creek	(Bloc)	3	1	100.0	2	1	100.0	0	0	0.0	5	1	100.0
	(Hyd)	11	2	100.0	6	1	50.0	0	0	0.0	17	2	100.0
Quinns Pond	(Hyd)	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0
Whitfield Creek	(Bloc)	4	2	22.2	0	0	0.0	92	3	33.3	96	4	44.4
		527	65	12.4	1,349	75	37.5	928	73	36.5	2,804	103	51.5

[1] All sites were streams within 150 km of Cairns in NQ.

the ceiling of each cage as food source for emergent adults. Emergent adults were removed and placed into new breeding chambers. We were unable to colonize *A. siennata* and *S. repititalis* in Brisbane, although some *A. siennata* were reared to the adult stage. The Brisbane colony of *N. eromenalis* lasted until the second generation, but no eggs were laid by these adults.

We made further attempts at establishing viable colonies of these stream-dwelling moths in 1988 after three NQ blacklight collections at Freshwater Creek in April and May yielded 20 to 40 adults of both *N. eromenalis* and *S. repititalis*, but only 10 adults of *A. siennata.* These adult moths were then taken to our Townsville laboratory and placed in covered aquaria containing fresh hydrilla for oviposition. The resulting colonies were too small for use in feeding trials but were maintained in a 25 °C constant temperature room to study their developmental rates. Because colony maintenance was time consuming, and as *S. repititalis* was more commonly collected on *B. octandra* and *V. ?spiralis* than on hydrilla, that colony was terminated.

The developmental times for any particular instar of both *N. eromenalis* and *A. siennata* are highly asynchronous. Even eggs from the same egg batch may hatch out over 3 to 4 days. The larvae then continue to develop at different rates, such that after 1 month, 3 or 4 different instars may be present from the same egg batch.

For *N. eromenalis*, at a constant temperature of 25 °C, most adults emerge 6 to 7 weeks after oviposition, but other adults may still be emerging several weeks later. At the fluctuating but generally cooler temperatures in the laboratory (20 to 27 °C), development to the adult stage takes at least 9 weeks. The small colony, asynchronous emergence of adults, and the short adult lifespan (5 to 7 days maximum) meant that rarely were there enough adults present at any one time for mating. These *N. eromenalis* colonies usually died out after several generations.

Because the colonies of *A. siennata* were smaller to begin with, and the larvae had asynchronous development, long larval life (>3 months), and a preference for flowing waters, colonies of this species were difficult to maintain. The pupal period of reared specimens of *A. siennata* collected at Freshwater Creek in August of 1989 averaged 21 days.

Laboratory Host-Specificity

We conducted preliminary laboratory host-specificity testing of these three stream-dwelling moths using field-collected larvae. Our triple-choice tests were aimed at determining the host preference for the three Hydrocharitaceae species from which they were collected in the field. An individual, late instar larva was confined in a small chamber with approximately 35 g of each of three plants: hydrilla, *B. octandra*, and *V. ?spiralis*. After 24 hr, the larva was removed, and each of the three plants portions in the chamber were scored

for feeding damage on a scale from 0 to 10, where 0 is no feeding, 1 corresponds to 10% of that particular plant being consumed, 2 represents 20% consumption, etc. As only a limited number of larvae were available for feeding tests, some larvae were tested on the same host plant more than once. The results of these preliminary tests are presented in Table 25.

These preliminary tests indicate a strong preference for hydrilla by all three types of larvae. *Nymphula eromenalis* and *A. siennata* larvae consumed more hydrilla than *S. repititalis* larvae. The levels of feeding on *B. octandra* and *V. ?spiralis* were low, even for *S. repititalis*, which was most frequently collected from these two plants in the field. Laboratory tests of each moth species were initiated to determine which of these plants could provide enough nutrition for a larva to complete its life cycle. However, due to high larval mortality on all hosts, these tests were not completed.

Table 25
Results of Preliminary Triple-Choice Feeding Tests of Three Stream-Dwelling Aquatic Moth Species (Lepidoptera: Pyralidae)

		Average Feeding Score		
Moth Species	Number of Tests	*Hydrilla verticillata*	*Blyxa octandra*	*Vallisneria ?spiralis*
Strepsinoma repititalis	153	1.4	0.4	0.3
Nymphula eromenalis	66	3.3	0.2	0.8
Aulacodes siennata	51	2.4	0.6	0.9

Summary

Three moth species, *A. siennata, N. eromenalis*, and *S. repititalis*, found in flowing streams in northern Queensland were studied for their potential as biocontrol agents for hydrilla. Although permission was received in 1989 to ship these moths to quarantine facilities in the United States, their unavailability at our field sites, coupled with the loss of funding, delayed further studies until the arrival in Australia of Dr. Dale Habeck. In September 1992, two of these moth species, *A. siennata* and *N. eromenalis*, were exported to quarantine facilities in the United States.

In the United States, many streams and rivers are infested with hydrilla. Herbicides and mechanical removal are inappropriate or ineffective at most of these lotic sites. The moths species that we (and Dr. Habeck) evaluated for the biological control of hydrilla appear to be best suited for use in streams and other lotic waters, and represent our best chance of controlling hydrilla in these habitats.

9 Other Insect Herbivores

Other Weevils

We collected eight undescribed species of *Bagous* weevils during this project, as well as two of the three *Bagous* species already known from Australia. At Carrs Creek, we collected larvae and adults of *B. clarenciensis* on *A. ?pinnata* (NSW90z101). *Bagous clarenciensis* was originally described from specimens collected in the Clarence River (Blackburn 1894a,b), of which Carrs Creek is a tributary. We have also collected this species on *A. ?pinnata* at Alice River (QLD85z101) and at Maroon Dam (SQL90z102), on *N. gigantea* at Enogerra Reservoir (SQL85z701), and on hydrilla at Moogerah Dam (SQL90z202).

The other described species of *Bagous* weevil which we collected during this project is *B. australasiae*. Unfortunately, various taxonomists have sequentially assigned this name to what today comprises three distinct species of *Bagous*. In 1985, our HSB specimens were said to be the same as those labeled as *B. australasiae* at ANIC. Specimens of another weevil, which we collected primarily from *N. indica*, was thought to represent a new species, *Bagous* n. sp. 2. In 1986, Dr. O'Brien, after comparing our specimens (of both species) with the type specimen of *B. australasiae* from the British Museum, reversed the identifications, declaring our hydrilla weevils to be a new species (see Chapter 6) and our weevils from *Nymphoides* to be *B. australasiae*. He was able to examine the type specimen of *B. australasiae* more closely in 1987 and confirmed the validity of his initial identifications. However, another change in taxonomy appears to have occurred. In the latest publication on Australian *Bagous* (O'Brien and Askevold 1992), almost all of our weevils collected from *N. indica* are being listed as the new species, *B. simulans* O'Brien. According to this publication, the only time *B. australasiae* was collected during this project, was in August 1985, on hydrilla at Atkinsons Dam, 50 km W of Brisbane (SQL85z221). The identity of the ANIC specimens labeled as *B. australasiae* is not known to us at this time.

In our earliest project reports, we referred to the weevil we collected from *Nymphoides* as *Bagous* n. sp. 2. From 1987 onward, we referred to it as *B. australasiae*. As mentioned above, it has now been described as *B. simulans*.

These *Nymphoides* weevils are similar in size and general appearance to HSB, but characters to distinguish them are provided by Balciunas and Purcell (1991). *Nymphoides* weevils were first collected by the senior author at Yellowater Billabong (NT) during his surveys there in 1982. This species has also been collected on several other aquatic plant species at several sites: on *B. octandra* at Double Barrel Creek (QLD87z160); on *Utricularia* sp. at Cattle Creek (QLD87z651); on hydrilla at Bohle River (QLD86z221), Atkinsons Dam (SQL85z221), and Ross River Dam (QLD85z271); on *P. crispus* at North Pine Dam (SQL88z404); and on *E. crassipes* at Ross River Dam. We have also collected these weevils at blacklights at Fogg Dam (NTR85L03, NTR85L09, and NTR85L10) and Yellowater Billabong (NTR85L02 and NTR85L04). Due to its morphological similarity to HSB, this species contaminated both our Keelbottom Billabong and Ross River Dam colonies which were used to conduct feeding trials. *Bagous simulans* would have soon died out, since their populations cannot persist upon hydrilla. Collections of *N. indica* from Ross River Dam (our best site for this plant species) which contained *B. simulans* were QLD85z705, QLD85z710, QLD85z720, QLD86z710, QLD86z717, QLD87z707, QLD87z709, and QLD87z710.

We managed to establish a colony of *Nymphoides* weevils upon *N. indica*, and even though they fed upon a variety of aquatic macrophytes, oviposition and larval development only occurred upon *N. indica*. These weevils were best collected at dusk (or later) on *N. indica* plants stranded on the shoreline, when the adults moved to the surface of the leaf to feed. They were collected in this manner from North Pine Dam and from Ewan Maddock Dam, 73 km N of Brisbane.

Early in 1985, we collected two specimens of another new species of weevil on hydrilla at Centenary Lake in Cairns (QLD85z220). They were initially referred to as *Bagous* n. sp. 1, then as *Utricularia* weevils, but they have now been formally described as *B. utriculariae* O'Brien (O'Brien and Askevold 1992). Since that first collection, we have only encountered this species on *Utricularia* sp. collected from Cattle Creek, our only site where this plant was consistently present. These collections were QLD87z651 (holotype and allotype ANIC), QLD87z652, QLD87z655, QLD87z657, and QLD86z667.

We have collected *Bagous* n. sp. 4, now described as *B. natator* O'Brien (O'Brien and Askevold 1992), as a blacklight (Alice River - QLD85L04), and upon several plant species at Ross River Dam: hydrilla (QLD89z201 and QLD89z207), *C. demersum* (QLD89z551), and *V. ?spiralis* (QLD89z351). The only specimen we collected outside of Townsville was from hydrilla at Yellowater Billabong, during surveys there by the senior author in 1983.

The holotype, allotype, and 6 paratypes of *Bagous* n. sp. 5, now described as *B. propinquus* O'Brien (O'Brien and Askevold 1992) came from one of our Fogg Dam blacklight collections (NTR85L03). Our only specimens of *B. propinquus* associated with a host plant came from our Keelbottom Billabong laboratory colony, which was kept on hydrilla. Other blacklight collections from Fogg Dam (NTR85L09 and NTR85L02) and Yellowater Billabong

(NTR85L02) also contained specimens of this species. The only berlese collection to contain this species was of hydrilla from Ross River Dam (QLD87z229).

The holotype and allotype of *B. josephi* O'Brien (O'Brien and Askevold 1992) come from one of our Fogg Dam blacklight collections (NTR85L09). Three specimens were also obtained from our Keelbottom Creek laboratory colony.

All twelve specimens that comprise the type series for what we call the *Blyxa* weevil, now described as *B. blyxae* O'Brien (O'Brien and Askevold 1992), were reared from larvae collected on *B. octandra* at Whitfield Creek (QLD86z173).

Our only specimen of *Bagous* n. sp. 6, now described as *B. purcelli* O'Brien and Askevold 1992), was collected on *E. densa* at Carrs Creek (NSW88z152).

We also collected weevils at blacklight that were identified as *Desiantha* spp., but are apparently *Echinocnemus* spp.,[1] a genus that was not previously known from Australia. This genus is probably quite common in Australia, as it is present in museums under the name *Desiantha* sp.[1]

Non-Weevil Insect Herbivores

All of our non-weevil coleopterans were identified by Dr. J. F. Lawrence (CSIRO Division of Entomology, Canberra). We have collected specimens of the Chrysomelidae beetle, *Donacia* spp., associated with hydrilla roots (and other aquatic plants). They were first found in Ingham but have since been widely collected from several sites. These specimens have been identified as *D. australasiae* Blackburn. In the laboratory, the larvae attached to hydrilla stems and remained there for many months. They did not die, but as the plants showed no sign of damage, we are not even sure if feeding occurred.

We reared another Chrysomelidae beetle, *Candezea palmerstoni*, from *M. ?drummondii*, while still another chrysomelid, *Haltica ignea*, was reared from *L. peploides*, and a small colony was briefly established on this plant in mid-1985.

Caddis-fly (Trichoptera) larvae were collected from many sites and had varying types of cases, most of which were made of plant tissue. Most of these cases were constructed of leaves, although some larvae sometimes drilled holes in wooden twigs or parts of plant stems. The larvae were maintained in small cups and were given fresh host plant and water daily. While some

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1 Personal communication, C. W. O'Brien.

larvae did feed on hydrilla, most failed to feed. Only 20% of the larvae placed into rearing cups reached the adult stage, and several species appear to be involved.

Chironomidae (Diptera) larvae were frequently found in our collections but were very difficult to rear in the laboratory. Placing them into cups with host plant material and water was not successful, but some larvae were reared to the adult stage by placing them into aerated water with host plant material. They damaged hydrilla by boring into the stem. These species were not further investigated due to lack of resources and the difficulty of testing and studying them.

The sawfly *Warra froggatti* (Hymenoptera: Pergidae) was colonized on *M. ?drummondii*. This sawfly belongs to the sub-family, Euryinae, which is restricted to Australia and New Guinea, and is usually found in leaf-litter (Naumann 1991). Observations on the biology and life-history of *W. froggatti* will be published by Dr. Ian Naumann.

10 Insect Shipments

HSB Shipments

The hydrilla stem boring weevil (HSB) was the first biocontrol of hydrilla candidate evaluated in Australia. We believe that it has the potential to be the most effective agent yet released against hydrilla in the United States. The first shipment of HSB to Gainesville quarantine was exported in April 1987. A further four shipments have been sent since then (Table 26). All HSB adults shipped to overseas quarantine facilities were collected from stranded hydrilla on the shores of Moogerah, North Pine, and Somerset Dams (Table 26). The hydrilla at these sites regularly grows in a band (up to 20 m wide) around the water body's perimeter, often "topping out" at the water surface. This hydrilla was readily accessible to the weevils. These dams also have wide, sandy shorelines which are ideal pupation sites for HSB. Stranded hydrilla and *V. ?spiralis* or fragmented hydrilla on the shore often contained high numbers of HSB. These weevils were hand-collected for overseas shipments by beating the stranded plants on white sheets, or by processing this material in a berlese funnel. Shipments of HSB weevils ceased when colonies were established in quarantine. These weevils have now been released at three sites in southern Florida, but in subsequent collections, they have only been found in low numbers at one site (Center 1992). Further releases of this weevil are planned (Center 1992).

Hydrellia balciunasi Shipments

With the release of *H. pakistanae* in Florida in 1987, there was considerable interest in its Australian relative, *H. balciunasi*, the first shipment of which was exported to Gainesville quarantine in January 1988. Since then a further 5 consignments have been sent (Table 26). These insects were collected directly from either Alice or Bohle Rivers in NQ or Petrie Park or North Pine Dam in SQ. All shipments, except one, were successful. In this one consignment, the hydrilla deteriorated due to a delay in transit, and all the *H. balciunasi* died. Another shipment was heavily parasitized by a micro-Hymenoptera species. Starting in 1989, *H. balciunasi* has been released at five

Table 26
ABCL Shipments of Hydrilla Biological Control Agents to Florida, 1985-1992

Date	Insect	Number/Life Stage[1]	Where Collected[2]
25 Sep 85	*Neohydronomus affinis*[3]	100 A	PR-LA
21 Feb 86	*Neohydronomus affinis*[3]	450 A	PR-LA
10 April 87	*Neohydronomus affinis*[3]	500 A	PR
	Bagous hydrillae	1,700 A	SD
29 May 87	*Bagous hydrillae*	1,005 A	SD-NPD
29 Jan 88	*Hydrillia balciunasi*	Approx 900 A, L & P	NPD
	Bagous hydrillae	1,000 A	SD-NPD
26 Feb 88	*Hydrellia balciunasi*	Approx 400 A, L & P	NPD
10 Aug 89	*Hydrellia balciunasi*	Approx 700-1000 A, L & P	PP
8 Nov 89	*Hydrellia balcuinasi*	100-200 L & P	NPD
15 May 91	*Bagous hydrillae*	600 A	NPD
1 Jul 91	*Hydrellia balciunasi*	800-1,000 L	BR
16 Feb 92	*Hydrellia balciunasi*	Approx 50 L	AR
	Bagous hydrillae	155 A	MD
12 Sep 92	*Aulacodes siennata*	Approx 8,000 E	LR
	Nymphula eromenalis	Approx 1,000 E	LR

[1] Life Stage Codes: A - Adults, L - Larvae, P - Pupae.
[2] Collection Site Codes:
South Queensland: PR - Park Ridge, SD - Somerset Dam, NPD - North Pine Dam, PP - Petrie Park, LA - Landsborough, MD - Moogerah Dam,
North Queensland: BR - Bohle River, AR - Alice River, LD - Laboratory reared.
[3] Used for biological control of *Pistia stratiotes*.

sites in Florida (Center 1992) and at one site in Texas, where establishment was reported to be occurring (Grodowitz and Snoddy 1992).

Aquatic Moth Shipments

The staff of ABCL has conducted research on several species of aquatic moths in NQ and obtained permission to send them to Gainesville quarantine. However subsequent collecting trips failed to find enough specimens to warrant a shipment, and funding for further research then ended. In September 1992, after 5 months researching aquatic moths in NQ, Dr. Habeck collected numerous adults of *A. siennata* and *N. eromenalis* at light traps near Mareeba. These adults subsequently laid eggs in the laboratory and ABCL staff shipped approximately 9,000 eggs of these two species to Gainesville quarantine in

Florida (Table 26). These moths successfully established in quarantine and are currently undergoing evaluation there.[1]

Neohydronomus affinis Shipments

Neohydronomus affinis Hustache is a biological control agent for the aquatic weed *Pistia stratiotes*, a problem weed in both Australia and the United States. This weevil was introduced into Australia from South America for quarantine evaluation in 1981 and was released in 1982. Rather than collecting these weevils from their native range, specimens were collected in Australia by the ABCL, in conjunction with CSIRO, for shipment to quarantine facilities in Florida. Three consignments were exported between 1985 and 1987 (Table 26). These weevils were collected from two pond sites in SQ, Landsborough and Park Ridge. *Pistia stratiotes* was collected from these sites and processed in berlese funnels to extract the weevils.

These weevils were used to establish colonies in the United States, from which quarantine studies and field releases were made. First released to Kreamer Island, Lake Okeechobee, in April 1987, these weevils quickly established. Following further releases at this site, their population increased to over 2.5 million by September 1988 (Dray et al. 1990), and the waterlettuce at this site dropped to less than 10% of its pre-weevil density (Dray and Center 1992). *Neohydronomus affinis* is now established at 6 Louisiana sites (Grodowitz 1991) and 45 Florida waterways, of which only one-third were release sites (Dray and Center 1992).

[1] Personal communication, D. H. Habeck.

11 Project Accomplishments and Recommendations for Future Research

Survey for Hydrilla Herbivores in Australia

The senior author's worldwide surveys for natural enemies of hydrilla between 1981 and 1983 covered three continents (Africa, Asia, and Australia), but most of the time was spent on travel and logistics, allowing only brief collecting at relatively few sites on each continent (Balciunas 1985). The present survey, while more limited geographically, was far more intensive and productive. A total of 573 quantitative collections of hydrilla were made from 60 sites in coastal Queensland and northern New South Wales. A further 15 quantitative hydrilla collections were made at 10 sites near Sydney, Mount Isa, and Darwin. These quantitative collections of hydrilla were supplemented by well over 100 non-quantitative collections, including a dozen blacklight collections.

Many of the hydrilla herbivores in Australia, including our top two candidates, had not been described. Dr. Ian Bock (1990) published the description of *Hydrellia balciunasi,* while the HSB weevil has been described as *Bagous hydrillae* by Dr. Charlie O'Brien (O'Brien and Askevold 1992).

The sampling effort on hydrilla in Australia exceeds that for surveys in the United States of hydrilla (Balciunas and Minno 1984, 1985) or Eurasian water-milfoil (Balciunas 1982a). Combined with the still ongoing surveys for hydrilla herbivores in China (Balciunas 1991), the herbivores of hydrilla have now been investigated on a global scale, exceeding that for any other aquatic plant.

Survey of Herbivores of Other Australian Aquatic Plant Species

To verify the host-specificity of our biological control of hydrilla candidates, we also made 1,007 quantitative collections of 47 other aquatic plant species from 27 families. These collections confirmed the safety of our top candidates and in the case of HSB were decisive in eventually securing permission for its field release in the United States.

Numerous new species of insects were found feeding on these aquatic plants. While most remain undescribed, we collected eight new species of *Bagous* weevils which have now been described by Dr. O'Brien (O'Brien and Askevold 1992). A new chironomid midge, *Dicrotendipes balciunasi* Epler, was among the other new species found during the course of this project (Epler 1988).

Development of the First Australian Biocontrol Insect for Hydrilla

During 1985, the first year of this project, we noted that hydrilla mats at some reservoirs near Brisbane were being "mowed" by a weevil. This weevil turned out to be new to science, but has since been described as *Bagous hydrillae* (O'Brien and Askevold 1992). We refer to it as the hydrilla stem-borer, or HSB. Our research over the next few years concentrated on HSB (documented in Chapter 6 and the appendixes). In the laboratory, this weevil could complete its life cycle on a variety of Hydrocharitaceae, and a few species from other families, although oviposition was highest on hydrilla. We therefore intensified our field research into these non-hydrilla hosts. Our surveys indicated that in the field, HSB only occasionally was found on these laboratory hosts, and that besides hydrilla, it was abundant only on one other plant, *Vallisneria ?spiralis*. The high populations on *V. ?spiralis* were limited to periods of drought, when *V. ?spiralis* plants were stranded on or near the shoreline.

In April 1987, we sent our first shipment of this weevil to quarantine in Gainesville. Our field data on HSB's host specificity, coupled with the Australian and Florida laboratory studies were strong enough to convince the TAG committee to approve the release of HSB in Florida. It was first released in March 1991 (Center 1992), but continued establishment in the field was not confirmed as of mid-1992.

Hydrilla balciunasi Research and Shipment

Leaf-mining larvae of *Hydrellia* were common in our collections from the beginning of the project. After we shipped the more spectacularly damaging HSB to Gainesville quarantine, our research focused on this group of flies. After Dr. Ian Bock (La Trobe University, Melbourne) examined thousands of our *Hydrellia* specimens, it became apparent that only one *Hydrellia* species (later named *H. balciunasi*) was common on hydrilla from eastern and northern Australia. Further field work (see Chapter 7) confirmed that 99.9% of the *Hydrellia* on hydrilla were *H. balciunasi*, while the few *H. balciunasi* on other aquatic plants were probably transient larvae, searching for pupation sites. We sent our first shipment of *H. balciunasi* to Gainesville in January 1988. It was approved for release in May 1989 (Center 1992) and has since established in Texas (Grodowitz and Snoddy 1992). The *H. balciunasi* populations in Florida seem to be replaced by *H. pakistanae*, which was released in Florida nearly 2 years earlier (Center 1992).

Research on Other Australian Hydrilla Insects

As elsewhere throughout most of hydrilla's native range, aquatic moths, belonging to the subfamily Nymphulinae (Lepidoptera: Pyralidae), were frequently found feeding upon it. The most commonly encountered moth on hydrilla in northern Queensland was identified as *Nymphula dicentra*. It was apparent to the senior author, that *N. dicentra* was extremely similar in appearance and habits to the widely distributed Asiatic hydrilla moth, *Parapoynx diminutalis*. Since *P. diminutalis* had already been accidentally introduced into Florida, we decided not to investigate *N. dicentra*. Forthcoming changes in the taxonomy of Australian moths will show *N. dicentra* as a synonym of *P. diminutalis*.[1]

We spent considerable effort, from mid-1987 until mid-1989, investigating moths which feed on hydrilla in streams. Hydrilla frequently becomes a serious pest in streams and rivers in the United States. Since control of hydrilla with herbicides in flowing waters is difficult, and frequently legally restricted, these insects were of special importance to us. We found that two of these moth species, *Aulacodes siennata* and *Nymphula eromenalis*, showed promise as biological control agents (see Chapter 8). However, both of these moths proved exceptionally difficult to rear, and colonies large enough to provide individuals for host-testing were never established. Host-testing of field-collected larvae indicated a range of acceptable hosts, although hydrilla appeared to be preferred. Since we could only collect these moths at a few locations, field host-specificity was difficult to determine conclusively. Funds for the project ended in 1989, before we could complete the necessary research into these two moth species.

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[1] Personal Communication. E. S. Nielsen.

In May 1992, Dr. Dale Habeck arrived in Australia and continued our investigations into these two moth species. Prior to his return to the United States in September 1992, we assisted him in shipping thousands of eggs of *A. siennata* and *N. eromenalis* to quarantine in Gainesville (see Chapters 8 and 10). Dr. Habeck is continuing his studies of these two moths in quarantine.

We also found a variety of other insects including larvae of Chrysomelidae beetles, Chironomidae midges, and several families of caddis-flies (Trichoptera) (see Chapter 9). However, these insects were difficult to rear and colonize. Also, from what we could discern from the limited literature on the host preferences of other members of the same taxa, there was little promise of host-specificity. Our limited resources prevented us from investigating any of these insect species thoroughly.

Waterlettuce Weevils

In the mid-1980's, as water hyacinth control was being realized in some locations in the southern United States, waterlettuce would expand into areas previously occupied by waterhyacinth. Fortuitously, CSIRO scientists in Australia had imported a weevil, *Neohydronomus affinis*, from South America and after extensive safety tests approved its release. Several small infestations of waterlettuce in Australia were quickly controlled by these weevils. In 1985, in conjunction with Dr. Dale Habeck, the senior author initiated a project to import, test, and release these weevils. We sent the first shipment of *N. affinis* to Gainesville quarantine in September 1985. After testing by Dr. Habeck, they were released in April 1987. They quickly established at several south Florida sites and have shown spectacular control at some of them (Dray et al. 1990).

Aquatic Weed Project in China

In 1988, the first hydrilla biological control agents from India were being released in Florida, and quarantine tests of the Australian insects were progressing well. However, the native distributions of the insects in quarantine did not indicate that they would be able to survive in cooler, temperate areas of the United States, into which hydrilla had recently expanded. The senior author (J. K. Balciunas) had been able to visit China during his worldwide surveys of hydrilla herbivores. In late 1988, USDA and the Chinese Academy of Agricultural Sciences formed the collaborative Sino-American Biological Control Laboratory in Beijing. The proposal for surveys in China for herbivores of hydrilla and Eurasian watermilfoil was one of the first projects approved for the new laboratory. Between 1989 and 1991, Dr. Balciunas served as the leader for this project, and made three, 4- to 5-week trips to China to search for aquatic insects. Promising biocontrol candidates were found, especially for hydrilla (Balciunas 1991). At the end of 1991, in order to devote more time to the expanding melaleuca project at the ABCL,

Dr. Balciunas turned over leadership for the China project to Dr. Gary Buckingham.

Current Research at ABCL

While we continue to supply aquatic insects to quarantine when requested (see Chapter 10), the major focus for the now expanded ABCL is melaleuca (*Melaleuca quinquenervia*). This Australian native was established as an ornamental in Florida at the beginning of the century. It soon escaped cultivation, and in the last 3 to 4 decades it has become an increasingly serious problem in south Florida (Balciunas and Center 1991). Melaleuca became a target for ABCL in late 1986. In 1989, with the winding down of the hydrilla project in Australia, melaleuca became our primary project. We now have found over 400 species of herbivorous insects attacking melaleuca in Australia (Balciunas et al. in press b). We shipped our first melaleuca insect, the weevil *Oxyops vitiosa*, to quarantine in July 1992.

Dozens of other plants of Australian origin have become serious weeds in the United States, especially in Florida and Hawaii. We anticipate adding Australian Pine (*Casuarina* spp.) as a target for research by ABCL in the near future.

Recommendations for Future Research

We have thoroughly surveyed hydrilla throughout its distribution along most of Australia's eastern coast. However, financial constraints prevented us from making any trips to West Australia. While, due to the arid conditions along the west coast, aquatic habitats are uncommon in this region, some contain hydrilla (Aston 1977, Swarbrick, Finlayson, and Caudwell 1981). It would not surprise us to find additional biological control agents there. For instance, the very limited collecting of aquatic insects in West Australia has shown the presence of numerous new species of *Bagous* weevils, for which none of the aquatic hosts are known.[1]

The history of previous weed biocontrol projects shows that it is highly unlikely that all the hydrilla insects released/in quarantine in the United States will become established. It is even more unlikely that a single hydrilla agent, once established, will provide control throughout hydrilla's large geographic range in the United States. Additional agents for hydrilla will almost certainly be required. Surveys in the remaining most promising locations in Australia should be organized while trained personnel and specialized facilities are still in place.

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[1] Personal Communication. C. W. O'Brien.

The ABCL is also well situated to carry out research on other, less troublesome aquatic weeds, which are native to Australia, and found at sites near our Townsville laboratory (Balciunas in press). These would include *Ipomoea aquatica* and *Azolla pinnata.*

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Appendix A Chronology of Foreign Searches for Insect Enemies of Hydrilla

1968	Hydrilla added to list of aquatic plants whose natural enemies are being investigated by Commonwealth Institute of Biological Control (CIBC) scientists in India.
1969	Rao, CIBC, reports that *Parapoynx diminutalis* is the most common and damaging insect natural enemy of hydrilla in India.
1971	CIBC initiates search for insect enemies of hydrilla in Pakistan.
1973	Varghese begins studies of insect enemies of hydrilla in Malaysia.
1973	Baloch and Sana-Ullah present preliminary report on natural enemies of hydrilla in Pakistan. Of the eight insect species and two snail species found, only the ephydrid fly *Hydrellia* sp., the moth *Parapoynx diminutalis*, and the weevil *Bagous* sp. nr. *limosus* are considered to be promising biocontrol agents and are being studied further.
1975	DelFosse et al. discover *Parapoynx diminutalis* in Fort Lauderdale, FL. This Asian species was probably accidentally introduced in a shipment of aquarium plants.
1975	Allen searches in Africa and Indonesia for insect enemies of hydrilla. Results not reported.
1976	Varghese and Singh present final report on studies in Malaysia. Only two insect enemies recorded. One, an aphid species, attacked hydrilla only in greenhouse culture. The other species, a moth, probably *Parapoynx diminutalis*, appears to be fairly specific to hydrilla.

1976	Baloch and Sana-Ullah submit final report on insect enemies of hydrilla in Pakistan. The biology and host-specificity of the three most promising biological control candidates have been studied. A *Bagous* species weevil which feeds on hydrilla tubers is fairly specific. *Parapoynx diminutalis* feeds and reproduces on several aquatic plant species. The leaf-mining *Hydrellia* sp. appeared to be quite specific to hydrilla, but it also fed on *Potamogeton* spp.
1976	Pemberton and Lazor conduct search in Africa for insect enemies. Hydrilla not found until late in 3-month survey and only one possible enemy, the larvae of a midge (Chironomidae), probably in the genus *Polypedilum*, is recorded.
1978	Sanders and Theriot discover a moth, later identified as *Parapoynx rugosalis*, damaging hydrilla in the Panama Canal Zone.
1979	Balciunas and Center study *Parapoynx* prob. *rugosalis* in Panama and find that it feeds primarily on hydrilla and *Najas*.
1980	Buckingham receives permission to bring Panamanian *Parapoynx* into quarantine facilities in Gainesville for further testing. However, the species collected by Sanders and Theriot and tested by Balciunas and Center can no longer be located in Panama.
1981	CIBC begins search for insect enemies of hydrilla in East Africa. Initial searches indicate hydrilla is not presented in Kenya.
1981	Balciunas spends 4 months searching for natural enemies of hydrilla in tropical Asia. Most of the insects previously recorded on hydrilla in Asia are found. Several species of *Bagous* weevils are found damaging hydrilla in India.
1982	Habeck and Bennett make two unsuccessful trips to Panama searching for *Parapoynx rugosalis* and the *Parapoynx* sp. tested by Balciunas and Center.
1982	Balciunas spends 6 months searching for natural enemies of hydrilla in Kenya, India, Southeast Asia, and northern Australia. Several new moth species are found damaging hydrilla, along with approximately 15 species of *Bagous* weevils.
1982	Balciunas sends *Bagous* spp. weevils from Pakistan to Gainesville quarantine.
1983	Markham (CIBC) begins studies of insects attacking hydrilla in Burundi, Rawanda, and Tanzania.
1983	CIBC scientists in India send several shipments of *Bagous affinis* to Gainesville quarantine.

1983 Balciunas spends 5 months searching for natural enemies of hydrilla in the Phillipines, Borneo, Malaysia, Bali, Papua New Guinea, northern Australia, Burma, and India. Weevils including *Bagous* spp. were again collected along with Pyralid moths from the genus *Parapoynx* and Ephydrid flies from the genus *Hydrellia*.

1985 Balciunas sets up a laboratory in Townsville and another in Brisbane (Queensland) to collect and evaluate Australian bio-control candidates.

1985 The leaf-mining fly *Hydrellia pakistanae* first shipped to Gainesville quarantine.

1987 First shipment of the hydrilla stem borer weevil *Bagous hydrillae* shipped from Australia to the Gainesville quarantine facility in Florida.

1987 First field release of *Hydrellia pakistanae* in Florida.

1987 First field release of *Bagous affinis* in Florida.

1988 USDA establishes the Sino-American Biological Control Laboratory (SABCL) in Beijing, China, to search for and evaluate temperate biocontrol agents of hydrilla.

1988 First shipment of the hydrilla leaf-mining fly *Hydrellia balciunasi* sent from Australia to the Gainesville quarantine facility in Florida.

1989 University of Florida biocontrol lab in Australia becomes a USDA facility, called the Australian Biological Control Laboratory; Balciunas appointed director.

1989 First field release of *Hydrellia balciunasi* in Florida.

1991 First field release of *Bagous hydrillae* in Florida.

1992 Dale Habeck spends 5 months researching stream-dwelling aquatic moths in north Queensland, Australia. Two of these moths, *Aulacodes siennata* and *Nymphula eromenalis*, are exported to quarantine facilities in the United States.

Appendix B
Example of a Field Collection Sheet Used During the Australian Hydrilla Project

COLLECTION#__________
DATE__________
TIME__________

HOST__________
COLLECTOR(S)__________

COLLECTION METHODS: HAND_____ RAKE_____ OTHER_____
SHORE_____ WADING_____ BOAT_____ OTHER_____

	SUNNY_____	DRY_____	CALM_____
SUNRISE_____	CLOUDY_____	SPRINKLES_____	BREEZY_____
SUNSET_____	OVERCAST_____	DRIZZLES_____	WINDY_____
MOON PHASE_____	DARK_____	SHOWERS_____	

COUNTRY_____ STATE/PROVINCE_____
COUNTY OR DISTRICT_____
SITE NAME_____
SITE LOCATION_____
NEAREST VILLAGE_____ DISTANCE TO SITE_____ DIRECTION TO SITE_____
NEAREST MAJOR CITY_____ DISTANCE TO SITE_____ DIRECTION TO SITE_____
LATITUDE_____ LONGITUDE_____ ELEVATION_____

TYPE OF WATER BODY_____ SIZE_____ SUBSTRATE_____
SAMPLING POINT DEPTH_____ DISTANCE TO SHORE_____ % SURFACE COVERED BY PLANTS_____

AQUATIC PLANT SPECIES	% PLANT COVER	% WATER COVER	DEPTH OF UPPER TIPS	FLOWERS COLOUR #'S	WET WGT

	SURFACE	BOTTOM
TEMPERATURE		
SALINITY		
CONDUCTIVITY		
PH		
NITRATES		
PHOSPHATES		
SECCHI DISK TRANPARENCY		

COLEOPTERA_____
DIPTERA_____
LEPIDOPTERA_____
TRICHOPTERA_____

INSECT ABUNDANCE_____

HABITAT DESCRIPTION_____

REMARKS ON PLANT POPULATIONS AND GROWTH_____

NOTES_____

Appendix C
Copy of HSB Life History Paper

J. Aust. ent. Soc., 1991, **30**: 333-338

DISTRIBUTION AND BIOLOGY OF A NEW *BAGOUS* WEEVIL (COLEOPTERA: CURCULIONIDAE) WHICH FEEDS ON THE AQUATIC WEED, *HYDRILLA VERTICILLATA*

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Abstract

A new, undescribed species of aquatic weevil, *Bagous* sp., was found feeding on the submersed aquatic plant, hydrilla, *Hydrilla verticillata*, at 21 sites, from Kakadu National Park in the N.T., to Grafton in N.S.W. The larvae and adults feed on hydrilla beneath the surface, fragmenting the stems, then continue feeding on floating fragments, and those stranded on the shoreline, where the larvae pupate. Single eggs are laid in hydrilla stems, within which the three larval instars develop. Development from egg to adult takes 12-14 d at 25°C. This *Bagous* weevil has been exported as a potential biological control agent to the United States, where hydrilla is a pest. Figures illustrating this new species and distinguishing it from the similar *Bagous australasiae* are provided.

Introduction

Hydrilla, *Hydrilla verticillata* (L.f.) Royle, is a submersed aquatic Hydrocharitaceae, native to Australia (Swarbrick *et al.* 1981), and to Asia and Central Africa (Cook and Luond 1982). It is most prevalent in tropical areas, but also occurs in cooler, temperate regions. In the U.S.A., hydrilla was once commonly sold as an aquarium plant, but is now naturalised and has become a noxious weed. Efforts in controlling this pest in the U.S.A., mostly through the use of herbicides, are widespread and expensive. In Florida, one of the most severely impacted states, control costs for hydrilla have exceeded $US8 million annually (Mahler 1979) and were estimated at $US48 million during the last decade (Schardt 1990).

During world-wide surveys to locate insects which might serve as biological control agents for this weed, the senior author collected briefly in northern Australia. At Kakadu National Park, in 1982 and 1983, he collected a small species of *Bagous* (Coleoptera: Curculionidae) weevil (Fig. 1) that fed on hydrilla (Balciunas 1985). In 1985, larvae of this weevil were found boring in hydrilla stems at several sites near Townsville, Queensland.

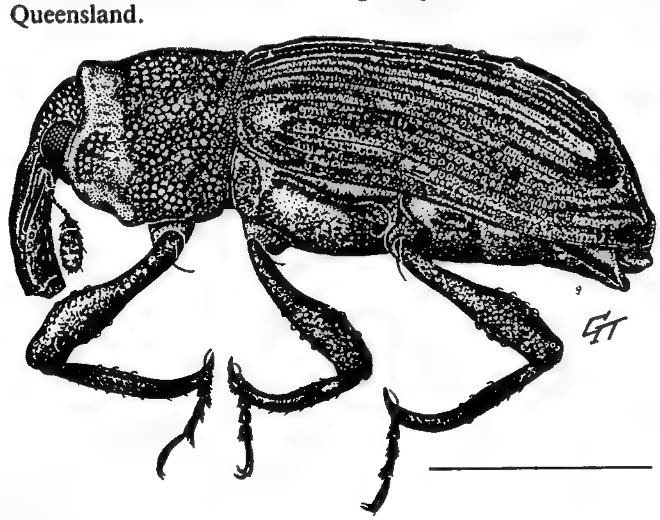

Fig. 1—Lateral view of HSB (Townsville, Queensland), a new species of *Bagous* weevil whose larvae bore within hydrilla stems. Scale line = 1.0 mm.

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Almost 100 years ago, Blackburn (1894a and 1894b) described all 3 species of *Bagous* (*B. adelaidae*, *B. australasiae*, and *B. clarenciensis*) known from Australia. Our hydrilla-feeding specimens were initially identified as *B. australasiae*. However, Dr C. W. O'Brien (Florida Agricultural & Mechanical University, Tallahassee, Florida), after comparing our specimens with the type specimen of *B. australasiae*, concluded that the *Bagous* sp. from hydrilla was new and undescribed. We found the "true" *B. australasiae* breeding on a marshwort, *Nymphoides indica* (L.) Kuntze, and collected several more new species of *Bagous* on other hosts (unpub. data). Dr O'Brien and Dr E. Zimmerman (Australian National Insect Collection, Canberra) are in the process of describing 20 additional species of Australian *Bagous*, including the one from hydrilla. Until this description is published, we will refer to it as the hydrilla stem borer (HSB). This paper describes our field and laboratory studies of the biology and life history of HSB.

Materials and methods

Collection procedures

Between January 1985 and December 1989, we regularly sampled herbivorous insects on hydrilla and other aquatic weeds in 2 main regions of eastern Australia: between the Daintree River and Townsville in north Queensland; and the coastal region from Gympie, Qld. to Coffs Harbour in N.S.W. We also occasionally sampled sites near Darwin and Kakadu in the N.T., Mt. Isa, Mackay and Rockhampton in Qld., and Sydney and Taree in N.S.W.

Aquatic plants were usually collected by hand while wading, or in inaccessible locations, by a rake attached to a rope. In deeper water, a boat or a surf ski was used. The samples were drained briefly, then placed into labelled, plastic bags for transportation to the laboratory inside an insulated container. Initially, a portion of each sample was examined using a dissecting microscope, and the remainder processed in berlese extraction funnels. The berleses were found to be the most efficient in extracting internal-feeding herbivores, and were the only method used after 1986. One to three 25W (occasionally 40W) bulbs were used depending on the size of the sample and of the berlese funnel (20.5 or 50 cm diam.), room temperature, and humidity. Bulb wattage was adjusted to slowly dry the sample over 4-6 d, which provided the most efficient recovery of insects.

Identification and sexing of HSB

Our laboratory studies were conducted from 1985 through 1988 at the CSIRO Long Pocket Laboratories in Brisbane, and either the CSIRO Davies Laboratory, or James Cook University, both in Townsville.

We successfully reared the larvae of various aquatic weevil species and associated them with their preferred host plants. After close examination of these specimens, we were able to distinguish both the larvae and adults of HSB from other aquatic weevils, especially *B. australasiae*, which we sometimes found in our hydrilla samples. A reliable method for quickly sexing HSB adults under low magnification (approx. 10×) was also developed.

Behavioural observations and studies

The periodicity of flight, as well as feeding and oviposition behaviour of HSB adults, was observed in the laboratory. Third-instar larvae, extracted from field-collected material, were placed in individual containers with hydrilla sprigs, and the length of their stem tunnels recorded daily. We varied the pupation media and its moisture content in the HSB pupation containers to optimise emergence.

To locate where HSB pupates in the field, we collected samples of: (1) soil; (2) hydrilla fragments embedded in silt; and (3) stranded hydrilla fragments, from Moogerah Dam, 95 km SE of Brisbane. Each of the three adjacent samples was 30 cm square by 4 cm deep. At the laboratory, the three samples were placed in gauze-covered, opaque plastic containers, and the field-collected HSB adults removed. We then inspected each container every 24 h for 4 d, and counted the HSB adults emerging from pupae in the samples.

Life history studies

We determined the fecundity of HSB by confining 45 newly-emerged females individually in 10 mL vials until they died. Each female was provided with a 5 cm tip of fresh hydrilla, 2 mL of deionised water, and a mature (at least 4 wk old) male. The vials were kept at 25 °C, and the water replaced as necessary, as were the dead males. Until the first eggs were found, the hydrilla was replaced every 12 h, thereafter, every 2 d. We counted the eggs in the hydrilla from each vial.

We determined the duration of HSB immature stages using three oviposition chambers (A, B, and C). Each chamber consisted of a clear plastic container (25 cm × 17.5 cm × 10 cm deep) lined with moist paper towelling, and contained approximately 60 g of fresh, field-collected hydrilla. Field-collected adults of HSB (n = 340) were introduced into chamber A, and held at 25 °C. The weevils were allowed to oviposit for 12 h, and then removed. This procedure was repeated for chambers B and C using the same adults, 12 and 24 h respectively, after A was initiated. The humidity in the chambers was controlled, and fresh hydrilla added as necessary.

After removal of HSB adults (mean age of eggs, 6 h), and every 12 h thereafter for 8 d, enough hydrilla from chamber A was examined under a microscope until 25 eggs and/or larvae/prepupae were found. The eggs and larvae were preserved, and their dimensions measured. By measuring these larvae of known age, we determined their instar. The prepupae were placed onto moist filter paper in petri dishes, and the pupation and adult emergence times recorded every 12 h. When sufficient immatures were unavailable in chamber A, hydrilla from chamber B, and subsequently chamber C, was used.

To determine adult longevity, we placed 60 newly-emerged HSB adults into 22 plastic vials (1-3 adults/10mL vial). Each vial contained a 3 cm tip of hydrilla, and was held at 25°C. Daily, the hydrilla was replaced (if necessary), dead adults removed, and their age (number of days after emergence) and sex recorded.

Table 1. Hydrilla sites (1985-1989) with Hydrilla Stem Boring Weevils (HSB).

Site	Latitude (S)	Longitude (E)	Hydrilla Collections Total (% with HSB)	HSB per kg	
				Adults	Larvae
New South Wales					
Alipou Creek	29°42.5′	152°37.0′	9 (11%)	0.0	0.9
Lismore Ski Lake	28°50.1′	153°15.9′	3 (33%)	2.2	8.2
Northern Territory					
Fogg Dam	12°34.0′	131°18.4′	3 (33%)	0.0	0.7
Northern Queensland					
Alice River	19°19.1′	146°35.6′	54 (15%)	0.1	0.7
Bohle River	19°17.5′	146°42.5′	21 (5%)	0.1	0.0
Keelbottom Billabong	19°29.4′	146°20.1′	19 (47%)	1.1	18.5
Keelbottom Creek	19°29.2′	146°20.0′	12 (33%)	0.3	3.8
Lake Mary Kathleen	20°47.1′	139°46.8′	2 (50%)	1.8	0.0
Lake Moondarra	20°36.4′	139°32.4′	2 (100%)	1.0	2.7
Louisa Creek	19°16.0′	146°45.0′	7 (14%)	0.0	0.4
Ross River Dam	19°27.5′	146°43.5′	51 (22%)	1.0	3.4
South-Eastern Queensland					
Atkinsons Dam	27°25.4′	152°26.8′	20 (20%)	9.0	0.7
Hinze Dam	28°03.3′	153°17.1′	3 (33%)	0.6	0.8
Lake Borumba	26°30.6′	152°34.8′	30 (67%)	6.8	10.2
Maroon Dam	28°10.8′	152°38.8′	16 (31%)	12.4	14.1
Mary River	26°43.9′	152°42.8′	27 (4%)	0.1	0.0
Mary River North	26°20.0′	152°42.5′	4 (25%)	0.6	0.4
Moogerah Dam	28°02.2′	152°33.4′	25 (32%)	5.7	23.8
North Pine Dam	27°16.2′	152°56.4′	33 (42%)	7.5	32.4
Petrie Park Pond	27°16.7′	152°58.8′	15 (40%)	0.4	8.9
Somerset Dam	27°06.4′	152°33.7′	25 (60%)	10.6	27.1

Results

Field collections

Between 1985 and 1989, we made 627 collections (mean weight 1.09 kg) of hydrilla at 68 sites. Except for the sites in the Cairns-Atherton region, HSB was collected at most of our sampling areas. A total of 1,723 HSB adults and 4,900 larvae were extracted from 115 of these collections at 21 sites (Table 1). Weevil densities were highest at some dams in south-eastern Qld., up to 636 adults and larvae/kg wet weight of hydrilla at North Pine Dam. Generally, lower numbers of HSB were found in hydrilla from rivers and creeks. Both adults (max. 200/kg) and larvae (max. 168/kg) were numerous in floating and stranded hydrilla, while 90% of the HSB extracted from submersed hydrilla were larvae (max. 566/kg). Floods and droughts at most sites obscured any regular, seasonal variation in population levels of HSB.

This survey also included 1,003 additional collections from 48 other plant species at 70 sites. At 26 of these sites, hydrilla, as well as HSB, was absent. Another Hydrocharitaceae, *Vallisneria ?gracilis* Bailey, provided 85% (146 adults and 1,482 larvae from 30 collections at 6 sites) of the HSB collected on plants other than hydrilla. Only 36 HSB adults and 252 larvae were extracted from 25 collections of 7 other aquatic plant species, which included 2 Hydrocharitaceae, *Egeria densa* Planch, and *Ottelia alismoides* (L.) Pers., as well as 5 non-Hydrocharitaceae: *Ceratophyllum demersum* L., *Najas tenuifolia* R. Brown, *Nymphoides indica, Potamogeton crispus* L. and *Potamogeton perfoliatus* L.

Species identification and sexing

B. australasiae has a posteriorly-directed projection on the lateral margin of the

pronotum, just forward of the procoxa (Fig. 2). This projection is absent on HSB (see Fig. 1), and distinguishes it from *B. australasiae*. HSB larvae have dorsal depressions on the tip of the abdomen while *B. australasiae* larvae, and some other Australian *Bagous* species larvae, have rounded posteriors.

The sex of HSB was determined by a broad, shallow depression on the first or basal abdominal sternite, between the hind coxae of males, which was absent in females.

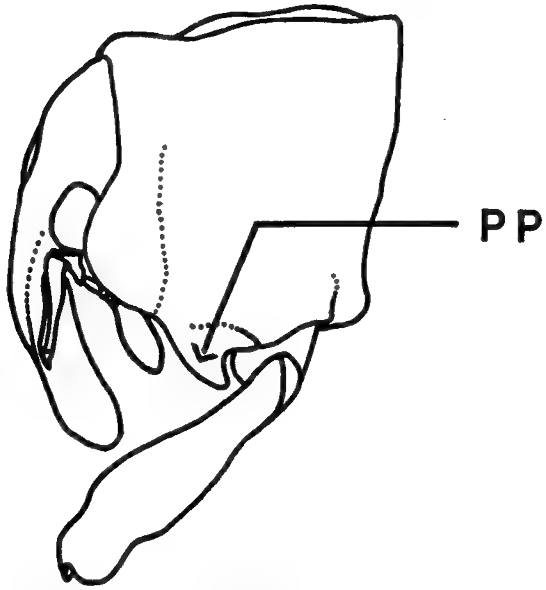

FIG. 2—Lateral view of anterior portion of *Bagous australasiae* (Townsville, Queensland). Note pronotal projection (PP), just anterior to the pro-coxa.

Behaviour

In aquaria, HSB began to fly at dusk, or when ambient lighting was reduced. Adults readily crawled beneath the water surface to feed. The feeding by HSB adults on hydrilla leaves left distinctive, "pepper-shot" holes. However, they preferred to feed on hydrilla stems near the leaf nodes, causing fragmentation. At some field sites, most of the hydrilla within a metre of the surface was gone, forming a windrow of fragments, sometimes 20-30 cm deep, along the leeward shore.

In the laboratory, female weevils inserted single eggs (rarely, 2 eggs) into punctures, near the leaf nodes, in stems of freshly-harvested hydrilla. HSB did not oviposit on hydrilla harvested more than 8-10 d earlier.

After hatching, the larvae bored within the stems, and also caused fragmentation. Third-instar larvae individually tunnelled through an average of 7.5 cm of stem (range = 1.5 – 26.0 cm, n = 81), then ceased feeding, and emerged from the stems to search for pupation sites. These prepupae became reduced in length, and their colour changed from milky-white to yellow. If pupation sites were not found within 2 d of leaving the hydrilla, the prepupae usually died.

In the laboratory, pupation occurred in damp sand, soil or vermiculite, but more adults emerged when moist filter paper or paper towelling was used. Moisture levels in the pupation containers were critical—dryness or excessive humidity resulted in deformed adults, or death. In the field, HSB pupae were found among stranded hydrilla fragments, and in the soil. The results of the Moogerah Dam pupation site study, indicated HSB preferred a hydrilla-silt composite in the field. After 4 d, only 14 adults had emerged from the soil, while 35 and 49 adults emerged from the stranded hydrilla and the hydrilla-silt composite, respectively.

Life history

The mean pre-oviposition period for 36 fecund females was 6.8 d (range = 3-10 d). Eggs (n = 20) were 0.52 mm (SD = 0.02) by 0.27 mm (SD = 0.01). These females laid an average of 3.0 eggs/d (max. = 15 eggs/d) and a mean of 101 eggs (range = 1-291 eggs) during a lifetime. Nine of the 45 test females failed to oviposit.

Mean head capsule widths (n = 20) of the 3 larval instars were 0.20 (SD = 0.01), 0.30 (SD = 0.01) and 0.45 mm (SD = 0.01). The durations of the egg stage and larval instars are shown in Fig. 3. The majority (92%) of the eggs hatched within 54-66 h. The number of first, second and third instars peaked at 78 h, 126 h and 162 h, respectively, after oviposition. All larvae reached the prepupal stage within 198 h (8.25 d). The mean prepupal period was 2.4 d (range = 1.5 – 3.5 d, n = 20) and the mean pupal duration was 3.9 d (range = 3.0 – 5.0 d, n = 46).

In the longevity study, males lived an average of 33 d (range = 2-83 d, n = 16) while female survival averaged 39 d (range = 2-98 d, n = 44). In the oviposition test, the average longevity of the 36 fecund females was 34 d (range = 7-65 d), while the 9 females which failed to oviposit lived for only 7.7 d (range = 4-12 d).

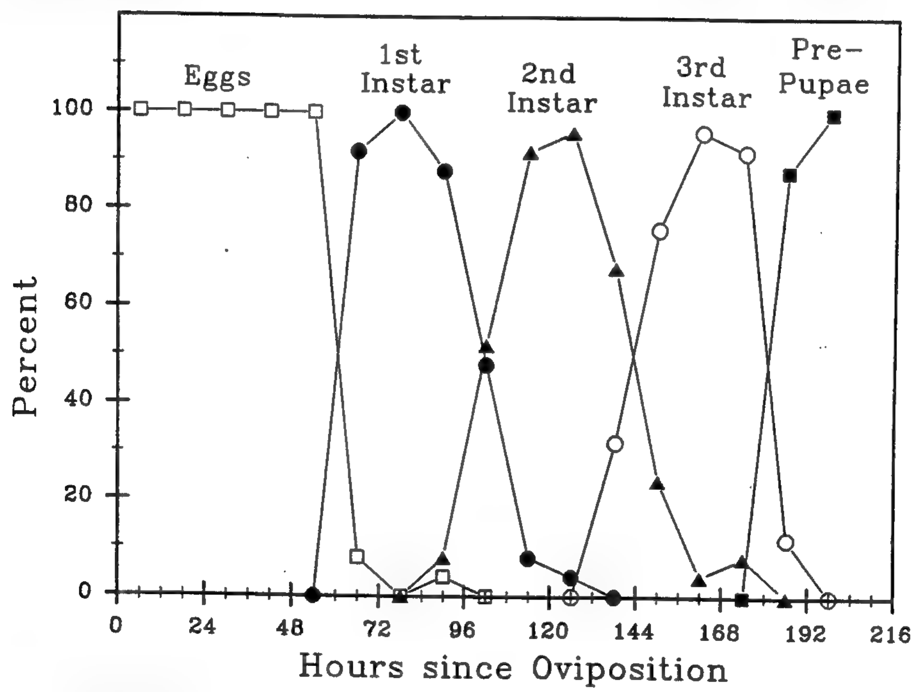

FIG. 3—Percentage of 25 immature hydrilla stem boring weevils (HSB) at each instar during successive 12 h intervals (temp = 25°C).

Discussion

A new species of *Bagous* weevil, whose larvae bore hydrilla stems, is widely distributed in Australia, from Kakadu in the Northern Territory to Grafton in northern N.S.W. It appears to be restricted to sites where hydrilla occurs, but can occasionally be collected from *Vallisneria*, or a few other aquatic plants, if the hydrilla becomes scarce or inaccessible to the weevils. The life history of HSB in the field appears to be as follows. In the evening, adults fly from the shoreline to hydrilla at the water's surface. They, as well as adults which spent the day in the water, crawl about the hydrilla below the surface, where they feed and oviposit. Females lay eggs singly within the stems, and may oviposit almost 300 eggs in a lifetime. HSB larvae pass through 3 instars within the stems, and develop from newly-laid egg to adult in 12-14 d. The

feeding damage caused by the adults and larvae of HSB induces fragmentation of hydrilla stems. These fragments float to the leeward shore (sometimes resulting in windrows of fragments), where larvae continue to feed until mature. The prepupae then exit the stems and pupate in the moist soil and/or moist hydrilla fragments. The adults can live more than three months.

At some dam sites with high populations of HSB, we observed a "mowing" effect on hydrilla. Since this weevil causes significant damage to hydrilla, has a short life cycle and a narrow host range (the results of our field and laboratory host-specificity tests are being reported elsewhere), it is a prime candidate for biological control of hydrilla. In 1987, we shipped HSB to the quarantine facilities in Gainesville, Florida U.S.A., where it has been evaluated further. Permission to release this weevil in the U.S.A. was received in February 1991.

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Appendix D
Feeding Score Criteria for HSB Weevils on Hydrilla

Score	Stems	Leaves
0	No feeding	No feeding
1	1 small hole	1 hole in any leaf
2	Several small holes, or portion of stem missing	1 large hole or up to 4 small holes
3	1 node almost completely missing	Minor damage to 5 or 6 leaves
4	Large portions of several nodes eaten	1 or 2 large holes
5	Definite host-stem chewed through at least once, with damage to others	8 leaves damaged with some large holes
6	2 nodes missing and damage to others	10 leaves damaged with a few fragmented
7	Most stem eaten, but tip and 1 or 2 nodes remain	Most leaves damaged with some fragments
8	Bottom 3 (or 4) nodes missing with feeding on apical tip	Most leaves fragmented, a few intact
9	1 or 2 fragments of stem remain	Only fragments of leaves left
10	Only tiny fragments of stem left	outline of leaves and tiny fragments

Note: Stems and leaves scored separately
Overall damage score also assigned
Overall damage score heavily weighted toward stem damage

Stem	Leaf	Overall
8	3	8
8	0	7
2	0	1
2	5	3
2	8	3

Appendix E
Results of HSB Feeding Trials on All Plant Species Except Hydrilla

Table E1

Trial Code No.[1]	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae						
Azo1*	24-26 Oct 85	0 days (Alice River)	0.00 (8)	0.00	0	SQ
Azo2*	26-28 Oct 85	2 days (Alice River)	0.00 (6)	0.00	0	SQ
Azo3	1-3 Nov 85	0 days (Alice River)	0.00 (4)	0.00	0	SQ
Azo4	12-14 Nov 85	6 days (Alice River)	0.00 (2)	0.00	0	SQ
Azo5	14-16 Nov 85	8 days? (Alice River)	0.00 (1)	0.00	0	SQ
Azo6	25-27 Feb 86	0 days (Centenary Lake)	0.57 (30)	0.16	0-3	RRD
Cab1	3-5 Mar 86	? (?)	0.75 (28)	0.34	0-7	RRD
Cab2	3-5 Mar 86	? (?)	0.42 (33)	0.16	0-4	KLB
Cer1*	10-12 Sept 85	? (?)	4.22 (9)	0.52	2-6	SQ
Cer2*	12-14 Sept 85	? (?)	4.90 (10)	0.46	3-7	SQ
Cer3*	19-21 Sept 85	0 days (Alice River)	4.11 (9)	0.68	2-7	SQ
Cer4*	25-27 Sept 85	2 days (Ross River Dam)	3.85 (20)	0.29	1-6	SQ
Cer5*	12-14 Oct 85	? (?)	3.29 (21)	0.39	1-8	SQ
Cer6*	11-13 Feb 86	? (?)	1.80 (30)	0.27	0-6	NQ
Cha1	22-24 Mar 86	2 days (Ross River Dam)	0.17 (24)	0.08	0-1	RRD
Cha2	22-24 Mar 86	2 days (Ross River Dam)	0.10 (31)	0.30	0-1	KLB
Cot1	15-17 Jan 86	? (?)	0.0 (65)	0.00	0	NQ

(Sheet 1 of 8)

[1] See Table 1 for explanation of codes.
* Trials possibly contaminated by other weevils.
** 1-day 2-weevil trials.

Table E1 (Continued)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae (Continued)						
Cpt1*	24-26 Oct 85	? (Fresh-water Creek)	0.00 (10)	0.00	0	SQ
Cpt2*	26-28 Oct 85	? (Fresh-water Creek)	0.00 (3)	0.00	0	SQ
Cpt3	27-29 Dec 85	? (Fresh-water Creek)	0.00 (39)	0.00	0	NQ
Ech1*	18-20 Oct 85	4 days (Ross River)	0.00 (10)	0.00	0	SQ
Ech2*	20-22 Oct 85	6 days? (Ross River?)	0.00 (8)	0.00	0	SQ
Ech3*	24-26 Oct 85	10 days? (Ross River?)	0.00 (3)	0.00	0	SQ
Ech4*	30 Oct-1 Nov 85	? (?)	0.00 (11)	0.00	0	SQ
Ech5	2-4 Jan 86	? (?)	0.00 (40)	0.00	0	NQ
Elc1*	18-20 Oct 85	1 day (Borrow Pits?)	0.00 (10)	0.00	0	SQ
Elc2*	20-22 Oct 85	3 days (Borrow Pits?)	0.00 (9)	0.00	0	SQ
Elc3	1-3 Nov 85	? (Borrow Pits?)	0.00 (13)	0.00	0	SQ
Elc4	29-31 Dec 85	? (?)	0.00 (38)	0.00	0	NQ
Ipo1	5-7 Nov 85	? (?)	0.00 (9)	0.00	0	SQ
Ipo2	7-9 Nov 85	? (?)	0.00 (6)	0.00	0	SQ
Ipo3	12-14 Nov 85	? (?)	0.00 (3)	0.00	0	SQ
Ipo4	14-16 Nov 85	? (?)	0.00 (2)	0.00	0	SQ
Ipo5	29-31 Dec 85	? (?)	0.00 (39)	0.00	0	NQ
Ldpp1*	30 Sept-2 Oct 85	? (?)	0.00 (20)	0.00	0	SQ

(Sheet 2 of 8)

Table E1 (Continued)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae (Continued)						
Ldpp2*	4-6 Oct 85	1 day (Keelbottom Billabong)	0.00 (20)	0.00	0	SQ
Ldpp3*	12-14 Oct 85	9 days? (Keelbottom Billabong?)	0.00 (2)	0.00	0	SQ
Ldpp4*	14-16 Oct 85	11 days? (Keelbottom Billabong)	0.00 (13)	0.00	0	SQ
Ldpp5	6-8 Jan 86	? (?)	0.00 (37)	0.00	0	NQ
Mar1*	24-26 Oct 85	0 days (Alice River)	0.00 (9)	0.00	0	SQ
Mar2*	30 Oct-1 Nov 85	6 days (Alice River)	0.00 (6)	0.00	0	SQ
Mar3	1-3 Nov 85	8 days (Alice River)	0.00 (2)	0.00	0	SQ
Mar4	7-9 Nov 85	1 day (Alice River)	0.00 (11)	0.00	0	SQ
Mar5	6-8 Jan 86	? (?)	0.00 (38)	0.00	0	NQ
Mon1	3-5 Mar 86	? (?)	0.00 (30)	0.00	0	KLB
Mytr1**	17-18 Nov 86	0 days (Harvey Creek Overflow)	0.43 (23)	0.14	0-2	?
Myvr1*	4-6 Oct 85	? (?)	0.26 (19)	0.19	0-3	SQ
Myvr2*	7-9 Oct 85	? (?)	0.44 (18)	0.17	0-2	SQ
Myvr3*	10-12 Oct 85	? (?)	0.45 (11)	0.16	0-1	SQ
Myvr4*	12-14 Oct 85	? (?)	1.00 (3)	0.00	1-1	SQ
Myvr5	29-31 Jan 86	0 days (Leichhardt Creek)	0.86 (35)	0.12	0-2	NQ
Naj1*	10-12 Oct 85	6 days (Ross River Dam)	2.86 (7)	0.46	2-5	SQ
Naj2*	12-14 Oct 85	8 days (Ross River Dam)	3.25 (12)	0.38	2-6	SQ

(Sheet 3 of 8)

Table E1 (Continued)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae (Continued)						
Naj3*	14-16 Oct 85	10 days? (Ross River Dam?)	3.21 (14)	0.41	1-6	SQ
Naj4	18-20 Feb 86	0 days (Goosepond Creek)	0.93 (40)	0.12	0-3	NQ
Nit1*	4-6 Oct 85	? (Alice River?)	0.25 (20)	0.05	0	SQ
Nit2*	7-9 Oct 85	? (Alice River?)	0.00 (18)	0.00	0	SQ
Nit3*	10-12 Oct 85	? (Alice River?)	0.11 (9)	0.04	0	SQ
Nit4*	14-16 Oct 85	? (Alice River?)	0.25 (4)	0.13	0	SQ
Ndin1*	16-18 Sept 85	3 days? (Borrow Pits?)	0.44 (9)	0.44	0-4	SQ
Ndin2*	19-21 Sept 85	6 days? (Borrow Pits?)	0.30 (10)	0.30	0-3	SQ
Ndin3*	21-23 Sept 85	0 days (Ross River Dam)	0.33 (9)	0.33	0-3	SQ
Ndin4*	23-25 Sept 85	0 days (Ross River Dam)	0.00 (20)	0.00	0-0	SQ
Ndin5*	30 Sept-2 Oct 85	7 days? (Ross River Dam?)	0.00 (20)	0.00	0-0	SQ
Ndin6*	7-9 Oct 86	? (?)	0.29 (7)	0.29	0-2	SQ
Ndin7	6-8 Mar 86	2 days (Ross River Dam)	0.07 (30)	0.05	0-1	KLB
Ndin8	6-8 Mar 86	2 days (Ross River Dam)	0.00 (27)	0.00	0-0	RRD
Nel1*	18-20 Oct 85	? (?)	0.00 (10)	0.00	0	SQ
Nel2*	20-22 Oct 85	? (?)	0.00 (10)	0.00	0	SQ
Nel3*	26-28 Oct 85	? (?)	0.00 (9)	0.00	0	SQ

(Sheet 4 of 8)

Table E1 (Continued)						
Trial Code No.	**Date Tested**	**Host Age and Site**	**Mean Score (No. Replicates)**	**Standard Error**	**Feeding Score Range**	**Weevil Population**
Non-Hydrocharitaceae (Continued)						
Nel4*	30 Oct-1 Nov 85	? (?)	0.00 (12)	0.00	0	SQ
Nel5	25-27 Feb 86	? (?)	0.00 (36)	0.00	0	NQ
Nygi1*	7-9 Oct 85	3 days (Bohle River)	1.09 (11)	0.21	0-2	SQ
Nygi2*	10-12 Oct 85	6 days (Bohle River)	1.50 (20)	0.30	0-4	SQ
Nygi3*	12-14 Oct 85	8 days? (Bohle River?)	3.17 (6)	0.54	1-5	SQ
Nygi4*	14-16 Oct 85	10 days? (Bohle River?)	2.91 (11)	0.37	1-4	SQ
Nygi5	18-20 Feb 86	0 days (Palmetum Ponds)	0.00 (40)	0.00	0	NQ
Nygi6	10-12 Apr 86	0 days (Bohle River)	0.00 (24)	0.00	0	KLB
Nygi7	10-12 Apr 86	0 days (Bohle River)	0.00 (22)	0.00	0	SQ
Nygi8	10-12 Apr 86	0 days (Bohle River)	0.00 (18)	0.00	0	RRD
Orz1[1]	4-6 Feb 86	? (?)	0.00 (33)	0.00	0	NQ
Orz2[1]	5-7 Feb 86	? (?)	0.00 (34)	0.00	0	NQ
Phl1	24-26 Nov 85	? (?)	0.00 (7)	0.00	0	SQ
Pol1*	14-16 Oct 85	0 days (Ross River)	0.00 (4)	0.00	0	SQ
Pol2	5-7 Nov 85	? (?)	0.00 (11)	0.00	0	SQ
Pol3	7-9 Nov 85	1 day (Alice River)	0.00 (4)	0.00	0	SQ
Pol4	11-13 Feb 86	? (?)	0.00 (32)	0.00	0	NQ
Pol5	6-8 Mar 86	? (Alice River)	0.00 (30)	0.00	0	KLB
Pttr1*	10-12 Sept 85	3 days (Ross River Dam)	0.11 (9)	0.11	0-1	SQ
(Sheet 5 of 8)						

Table E1 (Continued)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae (Continued)						
Pttr2*	12-14 Sept 85	5 days (Ross River Dam)	0.30 (10)	0.30	0-3	SQ
Pttr3*	21-23 Sept 85	0 days (Ross River Dam)	0.00 (10)	0.00	0	SQ
Pttr4*	23-25 Sept 85	0 days (Ross River Dam)	0.20 (20)	0.09	0-1	SQ
Pttr5*	25-27 Sept 85	2 days (Ross River Dam)	0.10 (20)	0.07	0-1	SQ
Pttr6	11-13 Mar 86	0 days (Ross River Dam)	0.63 (27)	0.17	0-3	KLB
Sal1*	18-20 Oct 85	0 days (Ross River)	0.00 (10)	0.00	0	SQ
Sal2*	20-22 Oct 85	2 days (Ross River)	0.00 (9)	0.00	0	SQ
Sal3*	24-26 Oct 85	6 days? (Ross River?)	0.00 (5)	0.00	0	SQ
Sal4*	26-28 Oct 85	8 days? (Ross River?)	0.00 (9)	0.00	0	SQ
Sal5*	30 Oct-1 Nov 85	12 days? (Ross River?)	0.00 (3)	0.00	0	SQ
Sal6	2-4 Jan 86	? (?)	0.00 (39)	0.00	0	NQ
Sci1	18-20 Jan 86	? (?)	0.00 (50)	0.00	0	NQ
Typ1*	18-20 Oct 85	1 day (?)	0.00 (11)	0.00	0	SQ
Typ2*	20-22 Oct 85	3 days (?)	0.00 (8)	0.00	0	SQ
Typ3*	26-28 Oct 85	9 days? (?)	0.00 (8)	0.00	0	SQ
Typ4	1-3 Nov 85	? (?)	0.00 (9)	0.00	0	SQ
Typ5	27-29 Nov 85	? (?)	0.00 (39)	0.00	0	NQ
Utr1	22-24 Apr 86	? (Centenary Lake)	0.11 (18)	0.08	0-1	KLB

(Sheet 6 of 8)

Table E1 (Continued)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Non-Hydrocharitaceae (Continued)						
Utr2	22-24 Apr 86	? (Centenary Lake)	0.62 (13)	0.37	0-4	SQ
Utr3	22-24 Apr 86	? (Centenary Lake)	0.13 (16)	0.09	0-1	RRD
Hydrocharitaceae						
Bloc1	12-14 Nov 85	? (?)	5.00 (19)	0.40	2-7	SQ
Bloc2	14-16 Nov 85	? (?)	5.11 (9)	0.45	3-7	SQ
Bloc3	29-31 Jan 86	0 days (Leichhardt Creek)	5.29 (34)	0.35	2-7	NQ
Egr1	1-3 Apr 86	? (southern Queensland)	2.62 (34)	0.33	0-7	SQ
Egr2	1-3 Apr 86	? (southern Queensland)	1.89 (35)	0.33	0-7	KLB
Egr3	1-3 Apr 86	? (southern Queensland)	1.38 (21)	0.35	0-7	RRD
Egr4**	8-9 Oct 86	? (?)	3.52 (23)	0.35	0-7	SQ
Eld1	25-27 Mar 86	? (southern Queensland)	1.43 (40)	0.14	0-4	KLB
Eld2	25-27 Mar 86	? (southern Queensland)	1.79 (39)	0.26	0-7	SQ
Eld3	25-27 Mar 86	? (southern Queensland)	1.70 (23)	0.25	0-5	RRD
Eld4**	16-17 Sept 86	0 days (Laboratory grown)	4.13 (16)	0.53	1-8	SQ
Otal1	14-16 Apr 86	? (Stuart Creek)	2.19 (21)	0.38	0-6	KLB
Otal2	14-16 Apr 86	? (Stuart Creek)	3.12 (17)	0.51	0-7	SQ
Otal3	14-16 Apr 86	? (Stuart Creek)	2.89 (18)	0.62	0-8	RRD
Otal4**	22-23 May 86	0 days (Stuart Creek)	2.21 (19)	0.30	0-5	KLB

(Sheet 7 of 8)

Table E1 (Concluded)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
Hydrocharitaceae (Continued)						
Otov1	29 Apr-1 May 86	1 day (Louisa Creek)	3.41 (29)	0.47	0-10	KLB
Otov2	29 Apr-1 May 86	1 day (Louisa Creek)	1.67 (15)	0.48	0-6	RRD
Otov3	29 Apr-1 May 86	1 day (Louisa Creek)	1.11 (10)	0.28	0-2	SQ
V1?sp1*	10-12 Sept 85	? (?)	3.50 (10)	0.69	0-7	SQ
V1?sp2*	12-14 Sept 85	? (?)	4.60 (10)	0.69	0-7	SQ
V1?sp3*	16-18 Sept 85	? (?)	2.78 (9)	0.89	0-6	SQ
V1?sp4*	19-21 Sept 85	? (?)	3.89 (9)	0.82	0-7	SQ
V1?sp5*	21-23 Sept 85	0 days (Ross River Dam)	2.67 (9)	0.73	0-6	SQ
V1?sp6*	23-25 Sept 85	0 days (Ross River Dam)	3.80 (20)	0.40	1-7	SQ
V1?sp7*	10-12 Oct 85	0 days (Ross River Dam)	3.50 (6)	0.62	2-6	SQ
V1?sp8*	12-14 Oct 85	2 days (Ross River Dam)	4.44 (9)	0.88	0-9	SQ
V1g?sp9*	14-16 Oct 85	4 days (Ross River Dam)	0.50 (2)	0.50	0-1	SQ
V1?sp10	11-13 Mar 86	0 days (Ross River Dam)	1.92 (26)	0.27	0-5	RRD
V1?sp11	11-13 Mar 86	0 days (Ross River Dam)	1.74 (39)	0.18	0-5	KLB

(Sheet 8 of 8)

Appendix F
Results of HSB Feeding Trials Upon Hydrilla

Table F1

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
2-Day 1-Weevil Trials						
Hyd 1*	8-10 Sep 85	0 days (Alice River)	6.76 (29)	0.41	0-10	SQ
Hyd 2*	14-16 Sep 85	1 day (Borrow Pits)	6.0 (28)	0.40	0-9	SQ
Hyd 3*	25-27 Sep 85	2 days (Ross River Dam)	5.28 (18)	0.55	2-9	SQ
Hyd 4*	30 Sep-2 Oct 85	7 days? (Ross River Dam)	6.25 (20)	0.49	2-10	SQ
Hyd 5*	14-16 Oct 85	0 days (Keelbottom Billabong)	6.4 (5)	0.68	4-8	SQ
Hyd 6	19-21 Feb 86	1 day (Goosepond Creek)	2.5 (38)	0.28	0-7	NQ
Hyd 7	19-21 Feb 86	1 day (Goosepond Creek)	2.03 (40)	0.24	0-6	RRD
Hyd 8	6-8 Apr 86	0 days (Alice River)	3.66 (29)	0.35	0-9	SQ
Hyd 9	6-8 Apr 86	0 days (Alice River)	4.63 (32)	0.35	0-9	KLB
Hyd 10	6-8 Apr 86	0 days (Alice River)	2.35 (20)	0.37	0-6	RRD
Hyd 11	13-15 May 86	0 days (Ross River Dam)	4.20 (22)	0.49	0-7	KLB
Hyd 12	13-15 May 86	0 days (Alice River)	4.30 (24)	0.56	0-9	KLB
Hyd 13	13-15 May 86	0 days (Stuart Creek)	3.46 (24)	0.59	0-9	KLB

(Sheet 1 of 5)

* Trials possibly contaminated by *Nymphoides* weevils.
[1] Weevils 4 days old.
[2] Simultaneous oviposition trial.
[3] Tubers used.
[4] New weevils.
[5] Host kept in nutrient solution for 8 days.
[6] Host kept in nutrient solution for 7 days.
[7] Host kept in nutrient solution for 14 days.
[8] Old weevils.

Table F1 (Continued)						
Trial Code No.	**Date Tested**	**Host Age and Site**	**Mean Score (No. Replicates)**	**Standard Error**	**Feeding Score Range**	**Weevil Population**
2-Day 1-Weevil Trials (Continued)						
Hyd 15	19-21 May 86	0 days (Borrow Pits)	4.96 (25)	0.27	2-7	KLB
Hyd 17	20-22 May 86	0 days (Bohle River)	2.84 (25)	0.35	0-7	KLB
Hyd 18	20-22 May 86	0 days (Ross River Dam)	4.20 (25)	0.42	0-8	KLB
Hyd 19	24-26 May 86	4 days (Ross River Dam)	2.26 (25)	0.19	0-3	KLB
Hyd 20	27-29 May 86	0 days (Alice River)	5.76 (25)	0.33	2-9	KLB
Hyd 21	27-29 May 86	0 days (?)	2.36 (25)	0.28	0-5	KLB
Hyd 22	27-29 May 86	0 days (Louisa Creek)	4.88 (25)	0.30	2-8	KLB & SQ
Hyd 57	10-12 June 86	0 days (Alice River)	5.21 (24)	0.31	2-7	KLB
Hyd 58	10-12 June 86	0 days (Borrow Pits)	6.58 (24)	0.26	4-9	KLB
Hyd 59	10-12 June 86	0 days (Ross River Dam)	3.86 (22)	0.34	0-6	KLB
1-Day 2-Weevil Trials						
Hyd 14	19-20 May 86	0 days (Borrow Pits)	7.5 (10)	0.45	5-10	KLB[1]
Hyd 16	22-23 May 86	2 days (Ross River Dam)	2.45 (20)	0.39	0-6	KLB[2]
Hyd 23	27-28 May 86	0 days (Alice River)	7.18 (22)	0.30	5-10	SQ
Hyd 24	28-29 May 86	1 day (Alice River)	6.95 (22)	0.22	5-9	SQ
Hyd 25	29-30 May 86	2 days (Alice River)	6.04 (24)	0.35	0-9	SQ
Hyd 26	30-31 May 86	3 days (Alice River)	2.76 (25)	0.39	0-6	SQ
						(Sheet 2 of 5)

Table F1 (Continued)						
Trial Code No.	**Date Tested**	**Host Age and Site**	**Mean Score (No. Replicates)**	**Standard Error**	**Feeding Score Range**	**Weevil Population**
			1-Day 2-Weevil Trials (Continued)			
Hyd 27	31 May-1 April 86	4 days (Alice River)	2.67 (24)	0.35	0-6	SQ
Hyd 28	1-2 April 86	5 days (Alice River)	1.13 (24)	0.15	0-3	SQ
Hyd 29	3-4 April 86	7 days (Alice River)	0.96 (25)	0.16	0-3	SQ
Hyd 30	4-5 April 86	8 days (Alice River)	0.78 (23)	0.14	0-2	SQ
Hyd 31	5-6 April 86	9 days (Alice River)	0.86 (22)	0.12	0-2	SQ
Hyd 32	27-28 May 86	0 days (Louisa Creek)	5.82 (22)	0.28	3-8	SQ
Hyd 33	27-28 May 86	0 days (Keelbottom Billabong)	3.52 (23)	0.36	0-7	SQ
Hyd 34	19-11 June 86	0 days (Alice River)	6.46 (24)	0.26	4-9	SQ
Hyd 35	11-12 June 86	1 day (Alice River)	6.43 (23)	0.20	5-8	SQ
Hyd 36	12-13 June 86	2 days (Alice River)	5.57 (23)	0.22	4-7	SQ
Hyd 37	13-14 June 86	3 days (Alice River)	4.35 (23)	0.38	0-7	SQ
Hyd 38	14-15 June 86	4 days (Alice River)	3.90 (20)	0.35	1-6	SQ
Hyd 39	15-16 June 86	5 days (Alice River)	4.50 (20)	0.31	2-7	SQ
Hyd 40	16-17 June 86	6 days (Alice River)	3.31 (26)	0.28	1-6	SQ
Hyd 41	17-18 June 86	7 days (Alice River)	3.31 (26)	0.28	1-6	SQ
Hyd 42	18-19 June 86	8 days (Alice River)	3.0 (26)	0.24	1-6	SQ
Hyd 43	19-20 June 86	9 days (Alice River)	2.75 (20)	0.41	0-6	SQ
Hyd 44	10-11 June 86	0 days (Borrow Pits)	7.35 (23)	0.21	5-9	SQ
						(Sheet 3 of 5)

Table F1 (Continued)						
Trial Code No.	**Date Tested**	**Host Age and Site**	**Mean Score (No. Replicates)**	**Standard Error**	**Feeding Score Range**	**Weevil Population**
			1-Day 2-Weevil Trials (Continued)			
Hyd 45	11-12 June 86	1 day (Borrow Pits)	7.36 (22)	0.25	5-10	SQ
Hyd 46	12-13 June 86	2 days (Borrow Pits)	6.05 (21)	0.27	3-8	SQ
Hyd 47	13-14 June 86	3 days (Borrow Pits)	5.95 (21)	0.20	4-7	SQ
Hyd 48	14-15 June 86	4 days (Borrow Pits)	5.15 (20)	0.34	2-7	SQ
Hyd 49	15-16 June 86	5 days (Borrow Pits)	4.50 (20)	0.33	2-7	SQ
Hyd 50	16-17 June 86	6 days (Borrow Pits)	4.23 (26)	0.21	2-6	SQ
Hyd 51	17-18 June 86	7 days (Borrow Pits)	4.42 (26)	0.17	3-6	SQ
Hyd 52	18-19 June 86	8 days (Borrow Pits)	4.0 (26)	0.25	1-6	SQ
Hyd 53	19-20 June 86	9 days (Borrow Pits)	3.79 (24)	0.31	1-7	SQ
Hyd 54	10-11 June 86	0 days (Ross River Dam)	4.65 (23)	0.33	1-7	SQ
Hyd 55	11-12 June 86	1 day (Ross River Dam)	4.39 (23)	0.29	1-7	SQ
Hyd 56	12-13 June 86	2 days (Ross River Dam)	3.91 (22)	0.34	1-7	SQ
Hyd 60	24-25 June 86	1 day (Louisa Creek)	3.67 (24)	0.51	1-9	SQ
Hyd 61	25-26 June 86	0 days (Borrow Pits)	4.04 (25)	0.40	1-8	SQ
Hyd 62	25-26 June 86	1 day (Borrow Pits)	2.52 (25)	0.22	1-4	SQ
Hyd 63	1-2 July 86	0 days (Ingham Botanical Gardens)	2.54 (24)	0.24	0-4	SQ
Hyd 64	10-11 July 86	0 days (Borrow Pits)	3.0 (20)	0.38	0-6	SQ
Hyd 65	16-17 July 86	0 days (Lab grown)	4.38 (16)	0.51	1-8	SQ
						(Sheet 4 of 5)

Table F1 (Concluded)

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range	Weevil Population
1-Day 2-Weevil Trials (Continued)						
Hyd 67	21-22 July 86	0 days (Ross River Dam)	1.76 (21)	0.21	0-4	SQ
Hyd 68	22-23 July 86	0 days (Borrow Pits)	1.79 (19)	0.20	0-3	SQ
Hyd 69	29-30 July 86	0 days (Alice River)	0.95 (21)	0.25	0-3	SQ[3]
Hyd 70	8-9 Aug 86	1 day (Borrow Pits)	2.76 (25)	0.30	1-7	SQ[4]
Hyd 71	22-23 Aug 86	0 days (Borrow Pits)	1.60 (20)	0.20	0-3	SQ
Hyd 72	26-27 Aug 86	8 days (?)	1.57 (23)	0.28	0-4	SQ[5]
Hyd 73	2-3 Sep 86	? (Freshwater Creek)	1.40 (15)	0.19	1-3	SQ
Hyd 74	8-9 Sep 86	7 days (Freshwater Creek)	3.0 (9)	0.44	1-5	SQ[6]
Hyd 76	14-15 Oct 86	0 days (Centenary Lake)	3.54 (24)	0.26	1-6	SQ
Hyd 77	31 Oct - 1 Nov 86	14 days (Holmes Jungle)	3.35 (20)	0.26	1-6	SQ[7]
Hyd 78	29-30 Oct 86	? (Holmes Jungle)	3.74 (23)	0.24	2-6	SQ[7]
Hyd 79	10-11 Oct 86	0 days (Keelbottom Billabong)	3.10 (24)	0.29	0-6	SQ?
Hyd 80	14-15 Nov 86	14 days (Holmes Jungle)	4.07 (14)	0.37	2-6	SQ[7,8]
Hyd 81	28-29 Nov 86	14 days? (Holmes Jungle)	2.65 (23)	0.23	1-5	SQ[7]

(Sheet 5 of 5)

Appendix G
Utricularia and *Blyxa* Weevil Feeding Trials

Trial Code No.	Date Tested	Host Age and Site	Mean Score (No. Replicates)	Standard Error	Feeding Score Range
		***Utricularia* weevil trials**			
Bloc4	23-24 Aug 86	5 days (??)	0.28(18)	0.11	0-1
Cer7	29-30 Jul 86	0 days (Alice River)	0.06 (18)	0.06	0-1
Hyd75	1-2 Oct 86	14 days? (Freshwater Creek)	4.82 (17)	0.58	1-8
Mar6	8-9 Aug 86	0 days (Alice River)	0.00 (23)	0.00	0
Naj5	31 Jul-1 Aug 86	2 days (Alice River)	0.04 (24)	0.04	0-1
Otal5	25-26 Jul 86	?(?)	0.00 (22)	0.00	0
Vigil	26-27 Jul 86	0 days (Lab Grown)	0.00 (24)	0.00	0
		***Blyxa* weevil trials**			
Bloc5	8-9 Oct 86	0 days (Lab Grown)	2.88 (16)	0.43	0-6
Hyd66	17-18 Jul 86	3 days (Borrow Pits)	0.00 (23)	0.00	0-0
Vl?sp12	30 Sep-1 Oct 86	1 day (Ross River Dam)	8.61 (18)	0.68	0-10

Appendix H
Results of One-Way ANOVA's for Selected HSB Feeding Trials

Trial No.	ANOVA[1]	Tukeys Conclusion	SNK Conclusion
Otal 1,2,3	Not sign.		
Otov 1,2,3	Sign.	1≠2=3; 1≠3	1≠2=3; 1≠3
Eld 1,2,3	Not sign.		
Egr 1,2,3	Sign.	1=2=3; 1≠3	1≠2=3; 1≠3
Hyd 8,9,10	Sign.	8=9≠10; 8=10	8≠9≠10; 8≠10
Hyd 11,12,13	Not sign.		
Hyd 20,21,22	Sign.	20=21=22; 20=22	20=21=22; 20=22
Hyd 57,58,59	Sign.	57=58≠59; 57≠59	57=58≠59; 57≠59
Hyd 23,32,33	Sign.	23=32=33; 23≠33	23≠32=33; 23≠33
Hyd 54,55,56	Not sign.		

[1] Not sign., not significant. Sign., signficant.

Appendix I
Results of 76 Oviposition and Larval Survival Tests of HSB Weevils on 10 Aquatic Plant Species

Table I1

Test Code	Date Tested	Dead ♂	Dead ♀	No. Eggs	Dead Immatures	No. 3rd Instar Removed	No. Pupae Removed	Adults Emerged From		% Survival Egg-Adult
								Chamber	Soil	
Blab1	9-12 May 86	0	0	13	0	12	0	0	7	53.8
Bloc1	17-20 Nov 86	0?	0?	22	0	1	15	0	13	59.1
Bloc2	24-27 Nov 86	0?	0?	33	0	16	1	0	7	21.2
Bloc3	24-27 Nov 86	0?	0?	38	0	20	4	0	11	28.9
Cab1	10-13 Jun 86	1	1	0	0	0	0	0	0	0
Cab2	15-18 Oct 86	0	0	0	0	0	0	0	0	0
Cer1	15-18 Apr 86	0	0	19	0	0	0	0	0	0
Cer2	17-20 Jun 86	1	0	3	0	2	1	0	3	100.0
Cer3	22-25 July 86	2	2	0	0	0	0	0	0	0
Egr1	4-7 Apr 86	0	0	57	2	35	5	1	34	61.4
Egr2	8-11 Apr 86	0	0	78	1	31	6	0	25	32.1
Egr3	8-11 Jul 86	0	0	30	0	15	2	0	21	40
Egr4*	22-25 Aug 86	--	--	--	--	--	--	--	--	--
Egr5	5-8 Sep 86	0	0	19	0	0	0	0	0	0
Egr6	7-10 Oct 86	0	0	24	1	16	0	0	10	41.7
Eld1	24-27 Oct 86	0	0	49	1	19	27	0	25	51.1
Hyd1	4-7 Apr 86	2	0	62	3	18	2	1	20	33.9

(Sheet 1 of 5)

* Trial eliminated from analysis due to test plant desiccation or incorrect egg counts.

Table I1 (Continued)

Test Code	Date Tested	Dead ♂	Dead ♀	No. Eggs	Dead Immatures	No. 3rd Instar Removed	No. Pupae Removed	Adults Emerged From		% Survival Egg-Adult
								Chamber	Soil	
Hyd2	8-11 Apr 86	0	0	39	0	13	2	0	13	33.3
Hyd3	15-18 Apr 86	0	0	74	3	35	4	0	23	31.1
Hyd4	15-18 Apr 86	1	1	141	5	87	0	0	57	40.4
Hyd5	21-24 Apr 86	2	2	96	1	62	1	0	40	41.7
Hyd6	22-25 Apr 86	0	0	20	4	11	0	0	10	50
Hyd7	28 Apr-1 May 86	0	0	135	41	30	1	0	25	18.5
Hyd8*	29 Apr-2 May 86	1	0	67	1	65	3	0	50	74.6
Hyd9	6-9 May 86	0	0	95	30	20	0	0	19	20
Hyd10*	6-9 May 86	0	1	49	0	53	1	0	34	69.4
Hyd11	9-12 May 86	0	1	22	5	16	0	0	14	63.6
Hyd12	13-16 May 86	0	1	57	13	29	1	0	26	45.6
Hyd13	13-16 May 86	0	0	78	0	66	1	0	49	62.8
Hyd14*	20-23 May 86	0	0	16	3	24	1	0	22	137.5
Hyd15	27-30 May 86	0	1	95	4	81	0	0	47	49.5
Hyd16	3-6 Jun 86	0	2	90	0	56	2	0	42	46.7
Hyd17	10-13 Jun 86	2	2	42	0	25	1	0	20	47.6
Hydu1	3-6 Jun 86	0	0	0	0	0	0	0	0	0
Hydu2	8-11 Aug 86	0	0	0	0	0	0	0	0	0

(Sheet 2 of 5)

Table I1 (Continued)

Test Code	Date Tested	Dead ♂	Dead ♀	No. Eggs	Dead Immatures	No. 3rd Instar Removed	No. Pupae Removed	Adults Emerged From		% Survival Egg-Adult
								Chamber	Soil	
Hydu3	28 Nov-1 Dec 86	0	0	0	0	0	0	0	0	0
Mar1	23-26 Jul 86	0	1	0	0	0	0	0	0	0
Mar2	15-18 Aug 86	0	0	0	0	0	0	0	0	0
Mar3	22-25 Aug 86	0	0	0	0	0	0	0	0	0
Myvr1	3-6 Jun 86	0	3	0	0	0	0	0	0	0
Myvr2	1-4 Jul 86	0	2	0	0	0	0	0	0	0
Myvr3	29 Jul-1 Aug 86	0	0	0	0	0	0	0	0	0
Myvr4	29 Aug-1 Sep 86	0	0	0	0	0	0	0	0	0
Naj1	6-9 May 86	0	0	12	1	1	0	0	1	8.3
Naj2	8-11 Aug 86	0	1	28	0	15	1	0	15	53.6
Naj3*	10-13 Nov 86	0	2	32	3	57	0	0	38	118.8
Naj4	9-12 Dec 86	0	0	10	0	5	1	0	2	20.0
Naj5	9-12 Dec 86	0	0	15	0	7	1	0	6	40.0
Otal1*	13-16 May 86	0	1	3	5	11	0	0	10	333.3
Otal2	16-19 Jun 86	0	0	21	2	15	0	0	15	71.4
Otal3	24-27 Jun 86	0	1	24	2	16	0	0	12	50
Otal4*	14-17 Nov 86	0	0	56	7	54	0	0	29	57.8
Otal5	17-20 Nov 86	0	0	54	10	31	0	0	27	50.0

(Sheet 3 of 5)

Table I1 (Continued)

Test Code	Date Tested	Dead ♂	Dead ♀	No. Eggs	Dead Immatures	No. 3rd Instar Removed	No. Pupae Removed	Adults Emerged From		% Survival Egg-Adult
								Chamber	Soil	
Otov1	28 Apr-1 May 86	0	0	17	2	16	0	0	8	47.1
Otov2*	29 Apr-2 May 86	0	3	37	3	41	2	0	20	54.1
Otov3	17-20 Jun 86	1	1	13	2	7	1	0	7	53.8
Otov4	29 Aug-1 Sep 86	0	0	0	0	0	0	0	0	0
Otov5	17-20 Oct 86	0	0	40	1	31	1	0	26	65
Otov6	17-20 Oct 86	0	0	24	0	19	1	1	13	54.2
Ptcr1	27-30 May 86	0	2	17	0	3	0	0	2	11.8
Ptcr2	15-18 Jul 86	1	0	1	0	0	0	0	0	0
Ptcr3	5-8 Aug 86	0	0	0	0	0	0	0	0	0
Ptpr1	20-23 May 86	1	0	0	0	0	0	0	0	0
Ptpr2	29 Jul-1 Aug 86	0	0	0	0	0	0	0	0	0
Ptpr3	29 Nov-1 Dec 86	0	0	0	0	0	0	0	0	0
Pttr1	17-20 Jun 86	0	1	0	0	0	0	0	0	0
Pttr2	21-24 Nov 86	1	0	0	0	0	0	0	0	0
Pttr3	21-24 Nov 86	0	1	0	0	0	0	0	0	0
Rice1	4-7 Feb 86	0	0	0	0	0	0	0	0	0
Rice2	16-19 Dec 86	0	0	0	0	0	0	0	0	0

(Sheet 4 of 5)

Table I1 (Concluded)

Test Code	Date Tested	Dead ♂	Dead ♀	No. Eggs	Dead Immatures	No. 3rd Instar Removed	No. Pupae Removed	Adults Emerged From		% Survival Egg-Adult
								Chamber	Soil	
VIgi1	13-16 May 86	0	0	10	0	4	0	0	2	20
VIgi2	2-5 Dec 86	0	0	16	0	13	1	0	4	25
VI?sp1	21-24 Apr 86	0	0	33	0	30	0	0	18	54.6
VI?sp2	22-25 Apr 86	0	0	54	7	9	0	0	3	5.6
VI?sp3	8-11 Jul 86	0	0	16	0	7	0	0	1	6.3
VI?sp4	7-10 Oct 86	0	0	27	0	10	1	2	9	40.7

(Sheet 5 of 5)

Appendix J
Database for North Queensland and Northern Territory Field Collections

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
NTR85L01	2-Aug-85	GB	Georgetown Billa				ERROR	0	0	0	ERROR	1
NTR85L02	7-Aug-85	YB	Yellowater Billa				ERROR	0	0	0	ERROR	1
NTR85L03	9-Oct-85	FD	Fogg Dam				ERROR	32	0	32	ERROR	1
NTR85L04	11-Oct-85	YB	Yellowater Billa				ERROR	3	0	3	ERROR	1
NTR85L05	13-Oct-85	FD	Fogg Dam				ERROR	0	0	0	ERROR	1
NTR85L06	14-Oct-85	FD	Fogg Dam				ERROR	0	0	0	ERROR	1
NTR85L09	31-Oct-85	FD	Fogg Dam				ERROR	0	0	0	ERROR	1
NTR85L10	5-Dec-85	FD	Fogg Dam				ERROR	0	0	0	ERROR	1
NTR85z101	1-Aug-85	FD	Fogg Dam	Pis	0.400	0.035	8.8	0	0	0	0.0	1
NTR85z201	1-Aug-85	FD	Fogg Dam	Hyd	0.300	0.015	5.0	0	0	0	0.0	1
NTR85z202	2-Aug-85	HJ	Holmes Jungle	Hyd	0.300	0.030	10.0	0	0	0	0.0	1
NTR85z203	6-Aug-85	GB	Georgetown Billa	Hyd	0.320	0.020	6.3	0	0	0	0.0	1
NTR85z204	7-Aug-85	YB	Yellowater Billa	Hyd	0.325	0.033	10.2	0	0	0	0.0	1
NTR85z205	9-Oct-85	FD	Fogg Dam	Hyd			ERROR	0	0	0	ERROR	
NTR85z206	9-Oct-85	HR	Howard River	Hyd			ERROR	0	0	0	ERROR	
NTR85z207	11-Oct-85	YB	Yellowater Billa	Hyd			ERROR	0	0	0	ERROR	
NTR85z208	15-Oct-85	FD	Fogg Dam	Hyd	0.710	0.050	7.0	0	1	1	1.4	2
NTR85z551	15-Oct-85	FD	Fogg Dam	Cer	0.350	0.023	6.6	0	0	0	0.0	1
NTR85z651	11-Oct-85	YB	Yellowater Billa	Vlsp			ERROR	0	0	0	ERROR	
NTR85z701	11-Oct-85	YB	Yellowater Billa	Nygi			ERROR	0	0	0	ERROR	
NTR85z702	15-Oct-85	FD	Fogg Dam	Ndin	0.380	0.031	8.2	0	0	0	0.0	1
NTR85z703	15-Oct-85	FD	Fogg Dam	Nel	0.365	0.030	8.2	0	0	0	0.0	1
NTR86z201	21-Oct-86	YB	Yellowater Billa	Hyd	0.700	0.095	13.6	0	0	0	0.0	2
NTR86z202	22-Oct-86	FD	Fogg Dam	Hyd	0.350	0.041	11.8	0	0	0	0.0	1
NTR86z203	28-Oct-86	HJ	Holmes Jungle	Hyd	0.700	0.082	11.7	0	0	0	0.0	2
NTR86z351	24-Oct-86	HR	Howard River	Vlsp	0.350	0.018	5.1	0	0	0	0.0	1
NTR86z352	28-Oct-86	HJ	Holmes Jungle	Vlsp	0.350	0.022	6.3	0	0	0	0.0	1
NTR86z501	22-Oct-86	FFC	Flying Fox Ck	Myvr	0.350	0.020	5.7	0	0	0	0.0	1
NTR86z551	21-Oct-86	YB	Yellowater Billa	Cer	0.350	0.027	7.8	0	0	0	0.0	1
NTR86z601	21-Oct-86	YB	Yellowater Billa	Naj	0.350	0.020	5.8	0	0	0	0.0	1
NTR86z701	21-Oct-86	YB	Yellowater Billa	Nygi	0.350	0.028	7.9	0	0	0	0.0	1
NTR86z702	21-Oct-86	YB	Yellowater Billa	Ndin	0.350	0.037	10.6	0	0	0	0.0	1
NTR86z801	27-Oct-86	BP	Borrow Pits	Mar	0.350	0.033	9.4	0	0	0	0.0	1
QLD85L01	9-Feb-85	AR	Alice River				ERROR	0	0	0	ERROR	1
QLD85L02	12-Mar-85	CL	Centenary Lake				ERROR	0	0	0	ERROR	1
QLD85L03	13-Mar-85	CL	Centenary Lake				ERROR	0	0	0	ERROR	1
QLD85L04	15-Apr-85	AR	Alice River				ERROR	2	0	2	ERROR	1
QLD85L05	16-Apr-85	AR	Alice River				ERROR	0	0	0	ERROR	1
QLD85L06	7-May-85	IBG	Ingham Botanical				ERROR	0	0	0	ERROR	1
QLD85L07	8-Jul-85	AR	Alice River				ERROR	0	0	0	ERROR	1
QLD85L08	11-Nov-85	AR	Alice River				ERROR	0	0	0	ERROR	1
QLD85L09	14-Nov-85	AR	Alice River				ERROR	0	0	0	ERROR	1
QLD85L10	2-Dec-85	KB	Keelbottom Billa				ERROR	0	0	0	ERROR	1
QLD85L11	10-Dec-85	KB	Keelbottom Billa				ERROR	0	0	0	ERROR	1
QLD85m201	29-Jan-85	KC	Keelbottom Creek	Hyd	0.590	0.090	15.3	1	0	1	1.7	1
QLD85m202	29-Jan-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1
QLD85m203	4-Feb-85	BR#1	Bohle River#1	Hyd	0.220		0.0	0	0	0	0.0	1
QLD85m204	5-Feb-85	RRD	Ross River Dam	Hyd			ERROR	0	0	0	ERROR	1
QLD85m206	9-Feb-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1
QLD85m209	18-Feb-85	IBG	Ingham Botanical	Hyd			ERROR	0	0	0	ERROR	1
QLD85m210	20-Feb-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1
QLD85m211	21-Feb-85	RRB	Ross River Bridg	Hyd			ERROR	0	0	0	ERROR	1
QLD85m212	25-Feb-85	BR#1	Bohle River#1	Hyd			ERROR	0	0	0	ERROR	1
QLD85m213	26-Feb-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1
QLD85m214	28-Feb-85	BP#2	Borrow Pit #2	Hyd			ERROR	0	0	0	ERROR	1
QLD85m215	5-Mar-85	IBG	Ingham Botanical	Hyd			ERROR	0	0	0	ERROR	1
QLD85m216	6-Mar-85	RRD	Ross River Dam	Hyd			ERROR	0	0	0	ERROR	1
QLD85m217	8-Mar-85	BP#2	Borrow Pit #2	Hyd			ERROR	0	0	0	ERROR	1
QLD85m218	12-Mar-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1

QLD85m220	14-Mar-85	CL	Centenary Lake	Hyd			ERROR	0	0	0	ERROR	1
QLD85m222	18-Mar-85	RRB	Ross River Bridg	Hyd			ERROR	0	0	0	ERROR	1
QLD85m223	20-Mar-85	AR	Alice River	Hyd			ERROR	0	0	0	ERROR	1
QLD85m224	21-Mar-85	RRD	Ross River Dam	Hyd			ERROR	0	0	0	ERROR	1
QLD85m229	27-Mar-85	GC	Granite Creek-Cl	Hyd	0.500	0.040	8.0	0	0	0	0.0	1
QLD85z297	20-Nov-85	RC	Rifle Creek	Hyd	1.410	0.111	7.9	0	0	0	0.0	2
QLD85z298	20-Nov-85	LMK	Lake Mary Kathle	Hyd	0.250		0.0	1	0	1	4.0	1
QLD85z299	22-Nov-85	LMK	Lake Mary Kathle	Hyd	0.300		0.0	0	0	0	0.0	1
QLD85m407	20-Nov-85	RC	Rifle Creek	Ptcr	0.260		0.0	0	0	0	0.0	1
QLD85z101	25-Oct-85	AR	Alice River	Azo	0.400	0.035	8.8	0	0	0	0.0	1
QLD85z102	1-Nov-85	AR	Alice River	Azo	0.680	0.043	6.3	0	0	0	0.0	2
QLD85z103	6-Nov-85	AR	Alice River	Azo	0.320	0.022	6.9	0	0	0	0.0	1
QLD85z104	14-Nov-85	AR	Alice River	Azo	0.365	0.022	6.0	0	0	0	0.0	1
QLD85z201	29-Jan-85	KC	Keelbottom Creek	Hyd	0.230	0.010	4.3	1	17	18	78.3	1
QLD85z202	29-Jan-85	AR	Alice River	Hyd	0.300	0.010	3.3	0	20	20	66.7	1
QLD85z204	5-Feb-85	RRD	Ross River Dam	Hyd	0.200	0.010	5.0	0	0	0	0.0	1
QLD85z205	6-Feb-85	BP#2	Borrow Pit #2	Hyd	0.800	0.070	8.8	0	0	0	0.0	2
QLD85z206	9-Feb-85	AR	Alice River	Hyd	1.525	0.078	5.1	0	0	0	0.0	4
QLD85z207	12-Feb-85	BP#2	Borrow Pit #2	Hyd	2.960	0.231	7.8	0	0	0	0.0	8
QLD85z208	13-Feb-85	KC	Keelbottom Creek	Hyd	1.050	0.076	7.2	0	0	0	0.0	3
QLD85z209	18-Feb-85	IBG	Ingham Botanical	Hyd	1.170	0.043	3.7	0	0	0	0.0	4
QLD85z210	20-Feb-85	AR	Alice River	Hyd	1.190	0.077	6.5	0	0	0	0.0	4
QLD85z211	21-Feb-85	RRB	Ross River Bridg	Hyd	1.860	0.115	6.2	0	0	0	0.0	6
QLD85z212	25-Feb-85	BR#1	Bohle River#1	Hyd	1.265	0.075	5.9	0	0	0	0.0	4
QLD85z213	26-Feb-85	AR	Alice River	Hyd	2.010	0.122	6.1	0	0	0	0.0	6
QLD85z214	28-Feb-85	BP#2	Borrow Pit #2	Hyd	1.830	0.107	5.8	0	0	0	0.0	6
QLD85z215	5-Mar-85	IBG	Ingham Botanical	Hyd	1.860	0.151	8.1	0	0	0	0.0	6
QLD85z216	6-Mar-85	RRD	Ross River Dam	Hyd	0.960	0.072	7.5	0	0	0	0.0	3
QLD85z217	8-Mar-85	BP#2	Borrow Pit #2	Hyd	1.800	0.121	6.7	0	0	0	0.0	6
QLD85z218	12-Mar-85	AR	Alice River	Hyd	0.900	0.077	8.6	0	0	0	0.0	3
QLD85z219	14-Mar-85	RRB	Ross River Bridg	Hyd	0.780	0.056	7.2	0	0	0	0.0	3
QLD85z220	14-Mar-85	CL	Centenary Lake	Hyd	1.420	0.132	9.3	0	0	0	0.0	5
QLD85z221	14-Mar-85	GPS	Garbutt Park Str	Hyd	0.950	0.090	9.5	0	0	0	0.0	3
QLD85z222	18-Mar-85	RRB	Ross River Bridg	Hyd	0.915	0.081	8.9	0	0	0	0.0	3
QLD85z223	20-Mar-85	AR	Alice River	Hyd	1.000	0.087	8.7	0	0	0	0.0	3
QLD85z224	21-Mar-85	RRD	Ross River Dam	Hyd	1.840	0.148	8.0	0	0	0	0.0	6
QLD85z230	25-Mar-85	BP#1	Borrow Pit #1	Hyd	1.820	0.156	8.6	0	0	0	0.0	6
QLD85z235	3-Apr-85	AR	Alice River	Hyd	0.910	0.043	4.7	0	0	0	0.0	3
QLD85z236	9-Apr-85	BP#2	Borrow Pit #2	Hyd	1.040	0.082	7.9	0	0	0	0.0	3
QLD85z237	16-Apr-85	AR	Alice River	Hyd	1.020	0.076	7.5	0	0	0	0.0	3
QLD85z238	22-Apr-85	BP#2	Borrow Pit #2	Hyd	1.020	0.205	20.1	0	0	0	0.0	3
QLD85z239	24-Apr-85	CL	Centenary Lake	Hyd	1.040	0.080	7.7	0	0	0	0.0	3
QLD85z240	29-Apr-85	AR	Alice River	Hyd	1.050	0.070	6.7	0	0	0	0.0	3
QLD85z241	7-May-85	IBG	Ingham Botanical	Hyd	0.980	0.063	6.4	0	0	0	0.0	3
QLD85z242	10-May-85	AR	Alice River	Hyd	1.010	0.060	5.9	0	0	0	0.0	3
QLD85z243	14-May-85	RRD	Ross River Dam	Hyd	1.750	0.111	6.3	0	0	0	0.0	5
QLD85z244	20-May-85	AR	Alice River	Hyd	1.070	0.062	5.8	0	0	0	0.0	3
QLD85z245	22-May-85	GP	Goosepond Creek	Hyd	1.280	0.078	6.1	0	0	0	0.0	4
QLD85z246	27-May-85	CL	Centenary Lake	Hyd	1.045	0.067	6.4	0	0	0	0.0	3
QLD85z247	4-Jun-85	BP#2	Borrow Pit #2	Hyd	1.050	0.059	5.6	0	0	0	0.0	3
QLD85z248	7-Jun-85	AR	Alice River	Hyd	1.050	0.070	6.7	1	4	5	4.8	3
QLD85z249	11-Jun-85	GP	Goosepond Creek	Hyd	1.070	0.079	7.4	0	0	0	0.0	3
QLD85z250	13-Jun-85	AR	Alice River	Hyd	1.360	0.090	6.6	0	0	0	0.0	4
QLD85z251	14-Jun-85	BR#2	Bohle River#2	Hyd	2.925	0.257	8.8	0	0	0	0.0	8
QLD85z252	19-Jun-85	AR	Alice River	Hyd	2.120	0.165	7.8	0	0	0	0.0	6
QLD85z253	24-Jun-85	BR#2	Bohle River#2	Hyd	2.810	0.187	6.7	0	0	0	0.0	8
QLD85z254	28-Jun-85	CL	Centenary Lake	Hyd	1.505	0.101	6.7	0	0	0	0.0	4
QLD85z255	28-Jun-85	IBG	Ingham Botanical	Hyd	1.465	0.106	7.2	0	0	0	0.0	4
QLD85z256	2-Jul-85	AR	Alice River	Hyd	2.100	0.155	7.4	0	1	1	0.5	6
QLD85z257	5-Jul-85	BP#2	Borrow Pit #2	Hyd	2.165	0.176	8.1	0	0	0	0.0	6
QLD85z258	7-Jul-85	IBG	Ingham Botanical	Hyd	0.380	0.028	7.4	0	0	0	0.0	1

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD85z259	10-Jul-85	KC	Keelbottom Creek	Hyd	1.070	0.080	7.5	0	0	0	0.0	3
QLD85z260	10-Jul-85	BR#2	Bohle River#2	Hyd	1.460	0.107	7.3	0	0	0	0.0	4
QLD85z261	16-Jul-85	CL	Centenary Lake	Hyd	1.445	0.068	4.7	0	0	0	0.0	4
QLD85z262	16-Jul-85	FWCk	Freshwater Creek	Hyd	1.060	0.028	2.6	0	0	0	0.0	3
QLD85z263	22-Jul-85	AR	Alice River	Hyd	2.115	0.146	6.9	0	0	0	0.0	6
QLD85z264	26-Jul-85	RRD	Ross River Dam	Hyd	1.050	0.069	6.6	1	0	1	1.0	3
QLD85z265	30-Jul-85	BP#2	Borrow Pit #2	Hyd	2.070	0.155	7.5	0	0	0	0.0	6
QLD85z266	2-Aug-85	IBG	Ingham Botanical	Hyd	1.415	0.102	7.2	0	0	0	0.0	4
QLD85z267	2-Aug-85	BR#2	Bohle River#2	Hyd	1.120	0.083	7.4	0	0	0	0.0	3
QLD85z268	8-Aug-85	AR	Alice River	Hyd	1.110	0.076	6.8	0	0	0	0.0	3
QLD85z269	13-Aug-85	CL	Centenary Lake	Hyd	1.375		0.0	0	0	0	0.0	4
QLD85z270	13-Aug-85	FWCk	Freshwater Creek	Hyd	1.060		0.0	0	0	0	0.0	3
QLD85z271	16-Aug-85	RRD	Ross River Dam	Hyd	1.485	0.099	6.7	1	0	1	0.7	4
QLD85z272	22-Aug-85	BP#2	Borrow Pit #2	Hyd	1.440	0.097	6.7	0	0	0	0.0	4
QLD85z273	26-Aug-85	KC	Keelbottom Creek	Hyd	1.055	0.075	7.1	0	0	0	0.0	3
QLD85z274	26-Aug-85	BR#2	Bohle River#2	Hyd	1.395	0.102	7.3	0	0	0	0.0	4
QLD85z275	30-Aug-85	AR	Alice River	Hyd	1.430	0.099	6.9	0	1	1	0.7	4
QLD85z276	3-Sep-85	IBG	Ingham Botanical	Hyd	1.830	0.107	5.8	0	0	0	0.0	5
QLD85z277	8-Sep-85	AR	Alice River	Hyd	1.835		0.0	0	0	0	0.0	5
QLD85z278	9-Sep-85	FWCk	Freshwater Creek	Hyd	1.120	0.086	7.7	0	0	0	0.0	3
QLD85z279	9-Sep-85	CL	Centenary Lake	Hyd	1.115	0.060	5.4	0	0	0	0.0	3
QLD85z280	13-Sep-85	BP#2	Borrow Pit #2	Hyd	2.100	0.143	6.8	0	0	0	0.0	6
QLD85z281	17-Sep-85	AR	Alice River	Hyd	1.455	0.089	6.1	0	0	0	0.0	4
QLD85z282	23-Sep-85	RRD	Ross River Dam	Hyd	1.170	0.077	6.6	0	0	0	0.0	3
QLD85z283	3-Oct-85	KC	Keelbottom Creek	Hyd	1.035	0.078	7.5	0	10	10	9.7	3
QLD85z284	4-Oct-85	BR#2	Bohle River#2	Hyd	1.435	0.095	6.6	0	0	0	0.0	4
QLD85z285	7-Oct-85	BP#2	Borrow Pit #2	Hyd	1.830	0.130	7.1	0	0	0	0.0	5
QLD85z286	14-Oct-85	KB	Keelbottom Billa	Hyd	2.970	0.207	7.0	0	37	37	12.5	8
QLD85z287	21-Oct-85	CL	Centenary Lake	Hyd	1.075		0.0	0	0	0	0.0	3
QLD85z288	21-Oct-85	FWCk	Freshwater Creek	Hyd	0.695		0.0	0	0	0	0.0	2
QLD85z289	24-Oct-85	IBG	Ingham Botanical	Hyd	0.685	0.047	6.9	0	0	0	0.0	2
QLD85z290	24-Oct-85	AR	Alice River	Hyd	1.430	0.100	7.0	0	0	0	0.0	4
QLD85z291	31-Oct-85	BP#2	Borrow Pit #2	Hyd	1.045	0.088	8.4	0	0	0	0.0	3
QLD85z292	1-Nov-85	AR	Alice River	Hyd	1.355	0.102	7.5	0	0	0	0.0	4
QLD85z293	6-Nov-85	AR	Alice River	Hyd	1.805	0.125	6.9	0	1	1	0.6	5
QLD85z294	14-Nov-85	AR	Alice River	Hyd	1.420	0.101	7.1	0	0	0	0.0	4
QLD85z295	15-Nov-85	KB	Keelbottom Billa	Hyd	2.180	0.146	6.7	0	0	0	0.0	6
QLD85z296	18-Nov-85	BP#2	Borrow Pit #2	Hyd	1.775	0.123	6.9	0	0	0	0.0	5
QLD85z300	22-Nov-85	LM	Lake Moondarra	Hyd	1.090	0.060	5.5	0	8	8	7.3	3
QLD85z301	22-Nov-85	CWL	Clearwater Lagoo	Hyd	1.035	0.065	6.3	0	0	0	0.0	3
QLD85z302	27-Nov-85	KB	Keelbottom Billa	Hyd	2.095	0.174	8.3	3	170	173	82.6	6
QLD85z303	29-Nov-85	KB	Keelbottom Billa	Hyd	2.555	0.191	7.5	21	152	173	67.7	8
QLD85z304	2-Dec-85	KB	Keelbottom Billa	Hyd	2.845	0.236	8.3	1	22	23	8.1	8
QLD85z305	4-Dec-85	AR	Alice River	Hyd	0.650	0.051	7.8	0	0	0	0.0	2
QLD85z306	6-Dec-85	KB	Keelbottom Billa	Hyd	1.100	0.128	11.6	1	52	53	48.2	3
QLD85z307	10-Dec-85	KB	Keelbottom Billa	Hyd	1.375	0.153	11.1	0	2	2	1.5	4
QLD85z308	10-Dec-85	RRD	Ross River Dam	Hyd	0.690	0.056	8.1	0	0	0	0.0	2
QLD85z309	8-Dec-85	IBG	Ingham Botanical	Hyd	0.724	0.052	7.2	0	0	0	0.0	2
QLD85z310	13-Dec-85	KB	Keelbottom Billa	Hyd	1.370	0.131	9.6	0	12	12	8.8	4
QLD85z311	15-Dec-85	CL	Centenary Lake	Hyd	1.055	0.098	9.3	0	0	0	0.0	3
QLD85z312	15-Dec-85	FWCk	Freshwater Creek	Hyd	0.720	0.067	9.3	0	0	0	0.0	2
QLD85z313	18-Dec-85	KB	Keelbottom Billa	Hyd	1.115	0.097	8.7	0	0	0	0.0	3
QLD85z401	14-May-85	RRD	Ross River Dam	Pttr	0.560	0.030	5.4	0	0	0	0.0	2
QLD85z402	10-Jul-85	KC	Keelbottom Creek	Ptjv	0.320	0.023	7.2	0	0	0	0.0	1
QLD85z403	26-Jul-85	RRD	Ross River Dam	Pttr	0.330	0.022	6.7	0	0	0	0.0	1
QLD85z404	16-Aug-85	RRD	Ross River Dam	Pttr	0.325	0.024	7.4	0	0	0	0.0	1
QLD85z405	26-Aug-85	KC	Keelbottom Creek	Ptjv	0.240	0.009	3.8	0	0	0	0.0	1
QLD85z406	23-Sep-85	RRD	Ross River Dam	Pttr	0.335	0.025	7.5	0	0	0	0.0	1
QLD85z408	22-Nov-85	CWL	Clearwater Lagoo	Pttr	0.670	0.039	5.8	0	0	0	0.0	2

QLD85z501	10-Jul-85	KC	Keelbottom Creek	Myvr	0.305	0.020	6.6	0	0	0	0.0	1
QLD85z502	26-Aug-85	KC	Keelbottom Creek	Myvr	0.345	0.011	3.2	0	0	0	0.0	1
QLD85z503	22-Nov-85	CWL	Clearwater Lagoo	Myvr	0.730	0.044	6.0	0	0	0	0.0	2
QLD85z504	22-Nov-85	LHR	Leichhardt River	Myvr	0.710	0.050	7.0	0	0	0	0.0	2
QLD85z551	24-Apr-85	CL	Centenary Lake	Cer	0.520	0.160	30.8	0	0	0	0.0	2
QLD85z552	29-Apr-85	AR	Alice River	Cer	0.530	0.030	5.7	0	0	0	0.0	2
QLD85z553	10-May-85	AR	Alice River	Cer	0.660	0.028	4.2	0	0	0	0.0	2
QLD85z554	20-May-85	AR	Alice River	Cer	1.020	0.057	5.6	0	0	0	0.0	3
QLD85z555	22-May-85	GP	Goosepond Creek	Cer	1.380	0.087	6.3	0	0	0	0.0	4
QLD85z556	11-Jun-85	GP	Goosepond Creek	Cer	1.065	0.077	7.2	0	0	0	0.0	3
QLD85z557	2-Jul-85	AR	Alice River	Cer	1.005	0.066	6.6	0	0	0	0.0	3
QLD85z558	10-Jul-85	KC	Keelbottom Creek	Cer	0.700	0.022	3.1	0	0	0	0.0	2
QLD85z559	22-Jul-85	AR	Alice River	Cer	1.080	0.081	7.5	0	0	0	0.0	3
QLD85z560	26-Jul-85	RRD	Ross River Dam	Cer	1.080	0.073	6.8	0	0	0	0.0	3
QLD85z561	8-Aug-85	AR	Alice River	Cer	1.090	0.082	7.5	0	0	0	0.0	3
QLD85z562	13-Aug-85	CL	Centenary Lake	Cer	0.775		0.0	0	0	0	0.0	2
QLD85z563	16-Aug-85	RRD	Ross River Dam	Cer	0.730	0.043	5.9	0	0	0	0.0	2
QLD85z564	30-Aug-85	AR	Alice River	Cer	0.715	0.040	5.6	0	0	0	0.0	2
QLD85z565	8-Sep-85	AR	Alice River	Cer	0.745		0.0	0	0	0	0.0	2
QLD85z566	9-Sep-85	CL	Centenary Lake	Cer	1.135	0.060	5.3	0	0	0	0.0	3
QLD85z567	19-Sep-85	AR	Alice River	Cer	1.460	0.083	5.7	0	0	0	0.0	4
QLD85z568	23-Sep-85	RRD	Ross River Dam	Cer	0.400	0.024	6.0	0	0	0	0.0	1
QLD85z569	21-Oct-85	CL	Centenary Lake	Cer	0.705		0.0	0	0	0	0.0	2
QLD85z570	15-Dec-85	CL	Centenary Lake	Cer	0.725	0.063	8.7	0	0	0	0.0	2
QLD85z601	3-Apr-85	AR	Alice River	Naj	0.930	0.058	6.2	0	0	0	0.0	3
QLD85z602	16-Apr-85	AR	Alice River	Naj	0.980	0.035	3.6	0	0	0	0.0	3
QLD85z603	29-Apr-85	AR	Alice River	Naj	0.970	0.064	6.6	0	0	0	0.0	3
QLD85z604	20-May-85	AR	Alice River	Naj	1.070	0.059	5.5	0	0	0	0.0	3
QLD85z605	7-Jun-85	AR	Alice River	Naj	0.990	0.062	6.3	0	0	0	0.0	3
QLD85z606	19-Jun-85	AR	Alice River	Naj	1.030	0.058	5.6	0	0	0	0.0	3
QLD85z607	2-Jul-85	AR	Alice River	Naj	0.490	0.031	6.3	0	0	0	0.0	2
QLD85z608	22-Jul-85	AR	Alice River	Naj	1.105	0.077	7.0	0	0	0	0.0	3
QLD85z609	26-Jul-85	RRD	Ross River Dam	Naj	0.325	0.022	6.8	0	0	0	0.0	1
QLD85z610	8-Aug-85	AR	Alice River	Naj	1.130	0.086	7.6	0	0	0	0.0	3
QLD85z611	16-Aug-85	RRD	Ross River Dam	Naj	0.395	0.022	5.6	0	0	0	0.0	1
QLD85z612	30-Aug-85	AR	Alice River	Naj	0.710	0.055	7.7	0	0	0	0.0	2
QLD85z613	8-Sep-85	AR	Alice River	Naj	0.725		0.0	0	0	0	0.0	2
QLD85z614	23-Sep-85	RRD	Ross River Dam	Naj	1.100	0.078	7.1	0	0	0	0.0	3
QLD85z615	10-Dec-85	RRD	Ross River Dam	Naj	0.355	0.022	6.2	0	0	0	0.0	1
QLD85z651	24-Apr-85	CL	Centenary Lake	Vl?sp	0.640	0.022	3.4	0	0	0	0.0	2
QLD85z652	7-May-85	IBG	Ingham Botanical	Vl?sp	0.800	0.046	5.8	0	0	0	0.0	3
QLD85z653	27-May-85	CL	Centenary Lake	Vl?sp	0.345	0.024	7.0	0	0	0	0.0	1
QLD85z654	28-Jun-85	IBG	Ingham Botanical	Vl?sp	0.985	0.062	6.3	0	0	0	0.0	3
QLD85z656	16-Jul-85	BR#1	Bohle River#1	Vl?sp	1.040	0.027	2.6	0	0	0	0.0	3
QLD85z657	26-Jul-85	RRD	Ross River Dam	Vl?sp	0.720	0.051	7.1	1	0	1	1.4	2
QLD85z658	2-Aug-85	IBG	Ingham Botanical	Vl?sp	1.025	0.087	8.5	0	0	0	0.0	3
QLD85z659	13-Aug-85	FWCk	Freshwater Creek	Vl?sp	1.070		0.0	0	0	0	0.0	3
QLD85z660	16-Aug-85	RRD	Ross River Dam	Vl?sp	0.700	0.085	12.1	0	0	0	0.0	2
QLD85z661	3-Sep-85	IBG	Ingham Botanical	Vl?sp	1.055	0.057	5.4	0	0	0	0.0	3
QLD85z662	9-Sep-85	FWCk	Freshwater Creek	Vl?sp	0.750	0.059	7.9	0	0	0	0.0	2
QLD85z663	23-Sep-85	RRD	Ross River Dam	Vl?sp	0.765	0.055	7.2	0	0	0	0.0	2
QLD85z664	3-Oct-85	KC	Keelbottom Creek	Nit	1.020	0.081	7.9	0	0	0	0.0	3
QLD85z665	21-Oct-85	FWCk	Freshwater Creek	Vl?sp	0.335		0.0	0	0	0	0.0	1
QLD85z666	24-Oct-85	IBG	Ingham Botanical	Vl?sp	0.330	0.021	6.4	0	0	0	0.0	1
QLD85z667	20-Nov-85	RC	Rifle Creek	Vl?sp			ERROR	0	0	0	ERROR	
QLD85z668	15-Dec-85	FWCk	Freshwater Creek	Vl?sp	0.713	0.070	9.8	0	0	0	0.0	2
QLD85z701	9-Apr-85	BP#2	Borrow Pit #2	Ndin	0.830	0.088	10.6	0	0	0	0.0	3
QLD85z703	22-Apr-85	BP#2	Borrow Pit #2	Ndin	0.830	0.145	17.5	0	0	0	0.0	3
QLD85z704	24-Apr-85	CL	Centenary Lake	Ndin	0.500	0.019	3.8	0	0	0	0.0	2
QLD85z705	14-May-85	RRD	Ross River Dam	Ndin	1.000	0.064	6.4	0	0	0	0.0	3
QLD85z706	4-Jun-85	BP#2	Borrow Pit #2	Ndin	0.600	0.030	5.0	0	0	0	0.0	2

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD85z707	24-Jun-85	BR#2	Bohle River#2	Nygi	0.345	0.020	5.8	0	0	0	0.0	1
QLD85z708	5-Jul-85	BP#2	Borrow Pit #2	Ndin	0.720	0.064	8.9	0	0	0	0.0	2
QLD85z709	11-Jul-85	BR#2	Bohle River#2	Nygi	0.685	0.066	9.6	0	0	0	0.0	2
QLD85z710	26-Jul-85	RRD	Ross River Dam	Ndin	0.680	0.061	9.0	0	0	0	0.0	2
QLD85z711	30-Jul-85	BP#2	Borrow Pit #2	Ndin	0.970	0.093	9.6	0	0	0	0.0	3
QLD85z712	2-Aug-85	BR#2	Bohle River#2	Nygi	0.690	0.065	9.4	0	0	0	0.0	2
QLD85z713	16-Aug-85	RRD	Ross River Dam	Ndin	0.760	0.066	8.7	0	0	0	0.0	2
QLD85z714	22-Aug-85	BP#2	Borrow Pit #2	Ndin	1.000	0.100	10.0	0	0	0	0.0	3
QLD85z715	26-Aug-85	BR#2	Bohle River#2	Nygi	0.365	0.029	7.9	0	0	0	0.0	1
QLD85z716	3-Sep-85	IBG	Ingham Botanical	Ndin	0.385	0.025	6.5	0	0	0	0.0	1
QLD85z717	3-Sep-85	IBG	Ingham Botanical	Nygi	0.780	0.052	6.7	0	0	0	0.0	2
QLD85z718	9-Sep-85	CL	Centenary Lake	Ndin	0.370	0.019	5.1	0	0	0	0.0	1
QLD85z719	13-Sep-85	BP#2	Borrow Pit #2	Ndin	0.385	0.031	8.1	0	0	0	0.0	1
QLD85z720	23-Sep-85	RRD	Ross River Dam	Ndin	0.655	0.062	9.5	0	0	0	0.0	2
QLD85z721	4-Oct-85	BR#2	Bohle River#2	Nygi	0.380	0.033	8.7	0	0	0	0.0	1
QLD85z722	7-Oct-85	BP#2	Borrow Pit #2	Ndin	0.330	0.029	8.8	0	0	0	0.0	1
QLD85z723	21-Oct-85	CL	Centenary Lake	Nygi	0.345		0.0	0	0	0	0.0	1
QLD85z724	10-Dec-85	RRD	Ross River Dam	Ndin	0.340	0.030	8.8	0	0	0	0.0	1
QLD85z801	7-Apr-85	AR	Alice River	Mar	0.300	0.030	10.0	0	0	0	0.0	1
QLD85z802	9-Apr-85	BP#2	Borrow Pit #2	Ipo	1.030	0.116	11.3	0	0	0	0.0	3
QLD85z803	16-Apr-85	AR	Alice River	Mar	0.730	0.045	6.2	0	0	0	0.0	?
QLD85z804	16-Apr-85	AR	Alice River	Ldpp	0.730	0.029	4.0	0	0	0	0.0	3
QLD85z805	22-Apr-85	BP#2	Borrow Pit #2	Ipo	0.790	0.225	28.5	0	0	0	0.0	3
QLD85z806	29-Apr-85	AR	Alice River	Ldpp	0.730	0.040	5.5	0	0	0	0.0	3
QLD85z807	29-Apr-85	AR	Alice River	Mar	0.200	0.011	5.5	0	0	0	0.0	1
QLD85z808	10-May-85	AR	Alice River	Mar	0.300	0.021	7.0	0	0	0	0.0	1
QLD85z809	10-May-85	AR	Alice River	Ldpp			ERROR	0	0	0	ERROR	
QLD85z810	20-May-85	AR	Alice River	Mar	0.260	0.015	5.8	0	0	0	0.0	1
QLD85z811	20-May-85	AR	Alice River	Ldpp	0.570	0.059	10.4	0	0	0	0.0	2
QLD85z812	16-Jun-85	BP#2	Borrow Pit #2	Ipo	0.990	0.062	6.3	0	0	0	0.0	3
QLD85z813	7-Jun-85	AR	Alice River	Mar	0.240	0.012	5.0	0	0	0	0.0	1
QLD85z814	19-Jun-85	AR	Alice River	Mar	0.240	0.011	4.6	0	0	0	0.0	1
QLD85z815	5-Jul-85	BP#2	Borrow Pit #2	Ipo	1.060	0.100	9.4	0	0	0	0.0	3
QLD85z816	30-Jul-85	BP#2	Borrow Pit #2	Ipo	0.980	0.085	8.7	0	0	0	0.0	3
QLD85z817	8-Aug-85	AR	Alice River	Ldpp	1.095	0.092	8.4	0	0	0	0.0	3
QLD85z818	22-Aug-85	BP#2	Borrow Pit #2	Ipo	1.070	0.111	10.4	0	0	0	0.0	3
QLD85z819	29-Aug-85	AR	Alice River	Mar	0.620	0.070	11.3	0	0	0	0.0	2
QLD85z820	30-Aug-85	AR	Alice River	Ldpp	0.340	0.020	5.9	0	0	0	0.0	1
QLD85z821	30-Aug-85	AR	Alice River	Pol	0.310	0.038	12.3	0	0	0	0.0	1
QLD85z822	8-Sep-85	AR	Alice River	Mar	0.360		0.0	0	0	0	0.0	1
QLD85z823	8-Sep-85	AR	Alice River	Ldpp	0.380		0.0	0	0	0	0.0	1
QLD85z824	8-Sep-85	AR	Alice River	Pol	0.365		0.0	0	0	0	0.0	1
QLD85z825	13-Sep-85	BP#2	Borrow Pit #2	Ipo	1.070	0.090	8.4	0	0	0	0.0	3
QLD85z826	17-Sep-85	AR	Alice River	Mar	0.320	0.022	6.9	0	0	0	0.0	1
QLD85z827	17-Sep-85	AR	Alice River	Ldpp	0.310	0.019	6.1	0	0	0	0.0	1
QLD85z828	3-Oct-85	KB	Keelbottom Billa	Ldpp	0.300	0.032	10.7	0	0	0	0.0	1
QLD85z829	7-Oct-85	BP#1	Borrow Pit #1	Ipo	0.580	0.061	10.5	0	0	0	0.0	2
QLD85z830	25-Oct-85	AR	Alice River	Mar	0.330	0.021	6.4	0	0	0	0.0	1
QLD85z831	6-Nov-85	AR	Alice River	Mar	0.310	0.018	5.8	0	0	0	0.0	1
QLD85z832	15-Nov-85	KB	Keelbottom Billa	Ldpp	0.345	0.029	8.4	0	0	0	0.0	1
QLD85z833	18-Nov-85	BP#2	Borrow Pit #2	Ipo	0.375	0.023	6.1	0	0	0	0.0	1
QLD85z834	27-Nov-85	KB	Keelbottom Billa	Ldpp	0.325	0.038	11.7	0	0	0	0.0	1
QLD85z835	18-Dec-85	KB	Keelbottom Billa	Ldpp	0.670	0.065	9.7	0	0	0	0.0	2
QLD86z101	25-Feb-86	CL	Centenary Lake	Azo	0.350	0.014	4.0	0	0	0	0.0	1
QLD86z102	28-Apr-86	LC	Louisa Creek	Pis	0.350	0.034	9.7	0	0	0	0.0	1
QLD86z103	13-May-86	RRD	Ross River Dam	Eic	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z104	19-May-86	LC	Louisa Creek	Pis	0.350	0.016	4.6	0	0	0	0.0	1
QLD86z105	23-Jun-86	LC	Louisa Creek	Pis	0.350	0.016	4.6	0	0	0	0.0	1
QLD86z106	18-Aug-86	FWCk	Freshwater Creek	Lem	0.280	0.012	4.3	0	0	0	0.0	1

QLD86z107	29-Sep-86	RRD	Ross River Dam	Eic	0.350	0.019	5.5	0	0	0	0.0	1
QLD86z108	29-Sep-86	RRD	Ross River Dam	Azo	0.350	0.023	6.6	0	0	0	0.0	1
QLD86z109	21-Oct-86	LC	Louisa Creek	Pis	0.350	0.021	5.9	0	0	0	0.0	1
QLD86z110	21-Oct-86	LC	Louisa Creek	Sal	0.350	0.024	7.0	0	0	0	0.0	1
QLD86z111	27-Oct-86	RRD	Ross River Dam	Eic	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z112	27-Oct-86	RRD	Ross River Dam	Azo	0.250	0.014	5.5	0	0	0	0.0	1
QLD86z113	3-Nov-86	CC	Cattle Creek	Eic	0.350	0.028	8.0	0	0	0	0.0	1
QLD86z114	24-Nov-86	LC	Louisa Creek	Azo	0.200	0.007	3.4	0	0	0	0.0	1
QLD86z115	24-Nov-86	LC	Louisa Creek	Sal	0.350	0.017	4.9	0	0	0	0.0	1
QLD86z116	24-Nov-86	LC	Louisa Creek	Pis	0.350	0.025	7.1	0	0	0	0.0	1
QLD86z117	24-Nov-86	SC	Stuart Creek	Lem	0.300	0.015	5.0	0	0	0	0.0	1
QLD86z118	1-Dec-86	RRD	Ross River Dam	Eic	0.350	0.018	5.1	0	0	0	0.0	1
QLD86z119	7-Dec-86	CC	Cattle Creek	Eic	0.350	0.033	9.5	0	0	0	0.0	1
QLD86z150	29-Jan-86	LHC	Leichhardt Creek	Bloc	0.350	0.030	8.6	0	0	0	0.0	1
QLD86z151	25-Feb-86	FWCk	Freshwater Creek	Bloc	0.370	0.020	5.4	0	0	0	0.0	1
QLD86z152	7-Apr-86	SC	Stuart Creek	Otal	0.715	0.066	9.2	0	0	0	0.0	2
QLD86z153	18-Apr-86	FWCk	Freshwater Creek	Bloc	0.350	0.078	22.3	0	0	0	0.0	1
QLD86z154	28-Apr-86	LC	Louisa Creek	Otov	0.370	0.024	6.5	0	0	0	0.0	1
QLD86z155	6-May-86	HC	Harvey Creek	Bloc	0.700	0.086	12.3	0	0	0	0.0	2
QLD86z156	19-May-86	LC	Louisa Creek	Otov	0.700	0.040	5.7	0	0	0	0.0	2
QLD86z157	27-May-86	AR	Alice River	Blab	0.285	0.022	7.7	0	0	0	0.0	1
QLD86z158	3-Jun-86	LHC	Leichhardt Creek	Blab	0.495	0.014	2.8	0	0	0	0.0	2
QLD86z159	5-Jun-86	SC	Stuart Creek	Otal	0.350	0.024	6.9	0	0	0	0.0	1
QLD86z160	17-Jun-86	FWCk	Freshwater Creek	Bloc	0.350	0.043	12.3	0	0	0	0.0	1
QLD86z161	17-Jun-86	HC	Harvey Creek	Bloc	0.700	0.118	16.9	0	0	0	0.0	2
QLD86z162	23-Jun-86	SC	Stuart Creek	Otal	0.700	0.066	9.4	0	0	0	0.0	2
QLD86z163	14-Jul-86	FWCk	Freshwater Creek	Bloc	0.700	0.078	11.1	0	0	0	0.0	2
QLD86z164	14-Jul-86	HC	Harvey Creek	Bloc	0.705	0.073	10.3	0	0	0	0.0	2
QLD86z165	28-Jul-86	WC	Whitfield Creek	Bloc	0.700	0.074	10.6	0	0	0	0.0	2
QLD86z166	5-Aug-86	SC	Stuart Creek	Otal	0.320	0.028	8.7	0	0	0	0.0	1
QLD86z167	18-Aug-86	FWCk	Freshwater Creek	Bloc	0.350	0.047	13.5	0	0	0	0.0	1
QLD86z168	18-Aug-86	HC	Harvey Creek	Bloc	0.350	0.038	10.9	0	0	0	0.0	1
QLD86z169	18-Aug-86	WC	Whitfield Creek	Bloc	0.750	0.107	14.3	0	0	0	0.0	2
QLD86z170	1-Sep-86	WC	Whitfield Creek	Bloc	0.360	0.030	8.4	0	0	0	0.0	1
QLD86z171	16-Sep-86	FWCk	Freshwater Creek	Bloc	0.350	0.066	18.9	0	0	0	0.0	1
QLD86z172	16-Sep-86	HC	Harvey Creek	Bloc	0.350	0.049	14.0	0	0	0	0.0	1
QLD86z173	16-Sep-86	WC	Whitfield Creek	Bloc	0.350	0.041	11.7	0	0	0	0.0	1
QLD86z174	23-Sep-86	SC	Stuart Creek	Otal	0.350	0.034	9.7	1	0	1	2.9	1
QLD86z175	14-Oct-86	HC	Harvey Creek	Bloc	0.700	0.062	8.9	0	0	0	0.0	2
QLD86z176	21-Oct-86	LC	Louisa Creek	Otov	0.350	0.023	6.5	0	0	0	0.0	1
QLD86z177	17-Nov-86	HC	Harvey Creek	Bloc	0.700	0.083	11.8	0	0	0	0.0	2
QLD86z178	17-Nov-86	LPC	Liverpool Creek	Bloc	0.350		0.0	0	0	0	0.0	1
QLD86z179	24-Nov-86	LC	Louisa Creek	Otov	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z180	15-Dec-86	FWCk	Freshwater Creek	Bloc	0.350	0.043	12.3	0	0	0	0.0	1
QLD86z181	15-Dec-86	HC	Harvey Creek	Bloc	0.350	0.030	8.6	0	0	0	0.0	1
QLD86z201	12-Jan-86	IBG	Ingham Botanical	Hyd	0.704	0.087	12.4	0	0	0	0.0	2
QLD86z202	13-Jan-86	KB	Keelbottom Billa	Hyd	1.080	0.163	15.1	1	36	37	34.3	3
QLD86z203	13-Jan-86	AR	Alice River	Hyd	1.060	0.108	10.2	0	0	0	0.0	3
QLD86z204	13-Jan-86	RRD	Ross River Dam	Hyd	0.725	0.046	6.3	0	0	0	0.0	2
QLD86z205	21-Jan-86	RRD	Ross River Dam	Hyd	1.095	0.076	6.9	0	0	0	0.0	3
QLD86z206	28-Jan-86	AR	Alice River	Hyd	1.150	0.108	9.4	0	0	0	0.0	3
QLD86z207	6-Feb-86	RRD	Ross River Dam	Hyd	0.975	0.085	8.7	0	20	20	20.5	3
QLD86z208	6-Feb-86	LM	Lake Moondarra	Hyd	1.843	0.242	13.1	3	0	3	1.6	5
QLD86z209	12-Feb-86	AR	Alice River	Hyd	0.390	0.032	8.2	0	0	0	0.0	1
QLD86z210	12-Feb-86	RRD	Ross River Dam	Hyd	0.675	0.048	7.1	0	0	0	0.0	2
QLD86z211	17-Feb-86	BR#1	Bohle River#1	Hyd	1.082	0.082	7.6	1	0	1	0.9	3
QLD86z212	18-Feb-86	GP	Goosepond Creek	Hyd	1.060	0.106	10.0	0	0	0	0.0	3
QLD86z213	21-Feb-86	RRD	Ross River Dam	Hyd	0.350	0.022	6.3	0	0	0	0.0	1
QLD86z214	25-Feb-86	CL	Centenary Lake	Hyd	1.085	0.102	9.4	0	0	0	0.0	3
QLD86z215	25-Feb-86	FWCk	Freshwater Creek	Hyd	0.715	0.070	9.8	0	0	0	0.0	2
QLD86z216	4-Mar-86	RRD	Ross River Dam	Hyd	1.050	0.086	8.2	0	0	0	0.0	3

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD86z217	4-Mar-86	AR	Alice River	Hyd	0.350	0.036	10.3	0	0	0	0.0	1
QLD86z218	10-Mar-86	AR	Alice River	Hyd	0.715	0.064	9.0	0	0	0	0.0	2
QLD86z219	10-Mar-86	BR#1	Bohle River#1	Hyd	0.730	0.068	9.3	0	0	0	0.0	2
QLD86z220	11-Mar-86	RRD	Ross River Dam	Hyd	0.705	0.052	7.4	0	0	0	0.0	2
QLD86z221	16-Mar-86	IBG	Ingham Botanical	Hyd	1.065	0.082	7.7	0	0	0	0.0	3
QLD86z222	16-Mar-86	PC	Palm Creek	Hyd	0.710	0.138	19.4	0	0	0	0.0	2
QLD86z223	17-Mar-86	LC	Louisa Creek	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD86z224	26-Mar-86	CL	Centenary Lake	Hyd	0.705	0.054	7.7	0	0	0	0.0	2
QLD86z225	27-Mar-86	RRD	Ross River Dam	Hyd	0.350	0.032	9.1	0	0	0	0.0	1
QLD86z226	28-Mar-86	BR#1	Bohle River#1	Hyd	0.350	0.054	15.4	0	0	0	0.0	1
QLD86z227	29-Mar-86	LHC	Leichhardt Creek	Hyd	0.355	0.028	7.9	0	0	0	0.0	1
QLD86z228	2-Apr-86	RRD	Ross River Dam	Hyd	0.730	0.068	9.3	0	0	0	0.0	2
QLD86z229	2-Apr-86	AR	Alice River	Hyd	1.120	0.144	12.9	0	0	0	0.0	3
QLD86z230	2-Apr-86	SC	Stuart Creek	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD86z231	15-Apr-86	RRD	Ross River Dam	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD86z232	17-Apr-86	BRR	Barron River	Hyd	0.715	0.064	9.0	0	0	0	0.0	2
QLD86z233	18-Apr-86	FWCk	Freshwater Creek	Hyd	0.700	0.128	18.3	0	0	0	0.0	2
QLD86z234	28-Apr-86	LC	Louisa Creek	Hyd	1.050	0.126	12.0	0	0	0	0.0	3
QLD86z235	30-Apr-86	KB	Keelbottom Billa	Hyd	1.100	0.106	9.6	0	0	0	0.0	3
QLD86z236	30-Apr-86	AR	Alice River	Hyd	0.700	0.076	10.9	0	0	0	0.0	2
QLD86z237	6-May-86	FWCk	Freshwater Creek	Hyd	0.695	0.054	7.8	0	0	0	0.0	2
QLD86z238	6-May-86	BRR	Barron River	Hyd	0.700	0.048	6.9	0	0	0	0.0	2
QLD86z239	6-May-86	CL	Centenary Lake	Hyd	0.335	0.025	7.5	0	0	0	0.0	1
QLD86z240	13-May-86	RRD	Ross River Dam	Hyd	0.700	0.048	6.9	0	0	0	0.0	2
QLD86z241	19-May-86	LC	Louisa Creek	Hyd	1.050	0.106	10.1	0	0	0	0.0	3
QLD86z242	19-May-86	BP#2	Borrow Pit #2	Hyd	1.050	0.096	9.1	0	0	0	0.0	3
QLD86z243	27-May-86	KC	Keelbottom Creek	Hyd	0.350	0.054	15.4	0	0	0	0.0	1
QLD86z244	27-May-86	KB	Keelbottom Billa	Hyd	1.050	0.098	9.3	0	0	0	0.0	3
QLD86z245	27-May-86	AR	Alice River	Hyd	1.050	0.108	10.3	0	0	0	0.0	3
QLD86z246	3-Jun-86	IBG	Ingham Botanical	Hyd	0.350	0.028	8.0	0	0	0	0.0	1
QLD86z247	3-Jun-86	CC	Cattle Creek	Hyd	0.350	0.022	6.3	0	0	0	0.0	1
QLD86z248	10-Jun-86	RRD	Ross River Dam	Hyd	0.700	0.049	7.0	0	0	0	0.0	2
QLD86z249	10-Jun-86	BP#2	Borrow Pit #2	Hyd	0.700	0.054	7.8	0	0	0	0.0	2
QLD86z250	17-Jun-86	FWCk	Freshwater Creek	Hyd	0.700	0.065	9.3	0	0	0	0.0	2
QLD86z251	17-Jun-86	CL	Centenary Lake	Hyd	0.350	0.029	8.3	0	0	0	0.0	1
QLD86z252	23-Jun-86	LC	Louisa Creek	Hyd	0.700	0.043	6.1	0	0	0	0.0	2
QLD86z253	23-Jun-86	SC	Stuart Creek	Hyd	0.350	0.032	9.0	0	0	0	0.0	1
QLD86z254	25-Jun-86	BP#2	Borrow Pit #2	Hyd	1.055	0.064	6.0	0	0	0	0.0	3
QLD86z255	30-Jun-86	KC	Keelbottom Creek	Hyd	0.230	0.024	10.4	0	0	0	0.0	1
QLD86z256	30-Jun-86	KB	Keelbottom Billa	Hyd	0.700	0.084	12.0	0	0	0	0.0	2
QLD86z257	30-Jun-86	AR	Alice River	Hyd	0.700	0.060	8.6	0	0	0	0.0	2
QLD86z258	1-Jul-86	IBG	Ingham Botanical	Hyd	0.350	0.024	6.8	0	0	0	0.0	1
QLD86z259	14-Jul-86	FWCk	Freshwater Creek	Hyd	0.710	0.059	8.3	0	0	0	0.0	2
QLD86z260	14-Jul-86	CL	Centenary Lake	Hyd	0.705	0.053	7.5	0	0	0	0.0	2
QLD86z261	21-Jul-86	RRD	Ross River Dam	Hyd	0.700	0.047	6.8	0	0	0	0.0	2
QLD86z262	22-Jul-86	BP#2	Borrow Pit #2	Hyd	0.350	0.022	6.4	0	0	0	0.0	1
QLD86z263	29-Jul-86	BR#2	Bohle River#2	Hyd	0.700	0.075	10.8	0	0	0	0.0	2
QLD86z264	29-Jul-86	AR	Alice River	Hyd	0.350	0.025	7.2	0	0	0	0.0	1
QLD86z265	5-Aug-86	SC	Stuart Creek	Hyd	0.700	0.060	8.6	0	0	0	0.0	2
QLD86z266	12-Aug-86	CWL	Clearwater Lagoo	Hyd	0.700	0.070	10.0	0	0	0	0.0	2
QLD86z267	18-Aug-86	FWCk	Freshwater Creek	Hyd	0.700	0.061	8.7	0	0	0	0.0	2
QLD86z268	18-Aug-86	CL	Centenary Lake	Hyd	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z269	25-Aug-86	RRD	Ross River Dam	Hyd	0.700	0.046	6.6	0	0	0	0.0	2
QLD86z270	2-Sep-86	KB	Keelbottom Billa	Hyd	0.720	0.064	8.8	0	0	0	0.0	2
QLD86z271	2-Sep-86	AR	Alice River	Hyd	0.360	0.031	8.7	0	0	0	0.0	1
QLD86z272	7-Sep-86	IBG	Ingham Botanical	Hyd	1.050	0.096	9.1	0	0	0	0.0	3
QLD86z273	7-Sep-86	CC	Cattle Creek	Hyd	0.270	0.028	10.3	0	0	0	0.0	1
QLD86z274	16-Sep-86	FWCk	Freshwater Creek	Hyd	0.700	0.052	7.4	0	0	0	0.0	2
QLD86z275	16-Sep-86	CL	Centenary Lake	Hyd	0.700	0.053	7.5	0	0	0	0.0	2

QLD86z276	20-Sep-86	GP	Goosepond Creek	Hyd	0.700	0.058	8.3	0	0	0	0.0	2
QLD86z277	23-Sep-86	SC	Stuart Creek	Hyd	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z278	23-Sep-86	BP#2	Borrow Pit #2	Hyd	0.700	0.041	5.9	0	0	0	0.0	2
QLD86z279	29-Sep-86	RRD	Ross River Dam	Hyd	0.700	0.058	8.3	0	0	0	0.0	2
QLD86z280	6-Oct-86	KB	Keelbottom Billa	Hyd	0.700	0.073	10.5	0	0	0	0.0	2
QLD86z281	6-Oct-86	AR	Alice River	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD86z282	14-Oct-86	FWCk	Freshwater Creek	Hyd	0.700	0.084	12.1	0	0	0	0.0	2
QLD86z283	14-Oct-86	CL	Centenary Lake	Hyd	0.700	0.051	7.2	0	0	0	0.0	2
QLD86z284	21-Oct-86	BR#2	Bohle River#2	Hyd	0.350	0.052	14.9	0	0	0	0.0	1
QLD86z285	21-Oct-86	LC	Louisa Creek	Hyd	0.350	0.032	9.1	0	0	0	0.0	1
QLD86z286	21-Oct-86	BP#2	Borrow Pit #2	Hyd	0.350	0.030	8.6	0	0	0	0.0	1
QLD86z287	21-Oct-86	SC	Stuart Creek	Hyd	0.350	0.036	10.3	0	0	0	0.0	1
QLD86z288	27-Oct-86	RRD	Ross River Dam	Hyd	0.700	0.057	8.1	0	0	0	0.0	2
QLD86z289	3-Nov-86	IBG	Ingham Botanical	Hyd	1.050	0.067	6.4	0	0	0	0.0	3
QLD86z290	3-Nov-86	CC	Cattle Creek	Hyd	0.700	0.069	9.8	0	0	0	0.0	2
QLD86z291	10-Nov-86	KB	Keelbottom Billa	Hyd	0.700	0.074	10.5	0	0	0	0.0	2
QLD86z292	10-Nov-86	AR	Alice River	Hyd	0.700	0.076	10.8	0	0	0	0.0	2
QLD86z293	17-Nov-86	FWCk	Freshwater Creek	Hyd	0.700	0.059	8.4	0	0	0	0.0	2
QLD86z294	17-Nov-86	CL	Centenary Lake	Hyd	0.350	0.028	7.9	0	0	0	0.0	1
QLD86z295	24-Nov-86	BP#2	Borrow Pit #2	Hyd	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z296	24-Nov-86	LC	Louisa Creek	Hyd	0.350	0.049	14.0	0	2	2	5.7	1
QLD86z297	24-Nov-86	SC	Stuart Creek	Hyd	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z298	1-Dec-86	RRD	Ross River Dam	Hyd	0.700	0.062	8.8	0	0	0	0.0	2
QLD86z299	7-Dec-86	IBG	Ingham Botanical	Hyd	0.700	0.047	6.7	0	0	0	0.0	2
QLD86z300	7-Dec-86	CC	Cattle Creek	Hyd	0.350	0.034	9.7	0	0	0	0.0	1
QLD86z301	15-Dec-86	FWCk	Freshwater Creek	Hyd	0.700	0.082	11.6	0	0	0	0.0	2
QLD86z302	15-Dec-86	CL	Centenary Lake	Hyd	0.350	0.026	7.6	0	0	0	0.0	1
QLD86z350	21-Jan-86	RRD	Ross River Dam	Vl?sp	0.735	0.038	5.2	0	0	0	0.0	2
QLD86z351	16-Mar-86	IBG	Ingham Botanical	Vl?sp	0.716	0.062	8.7	0	0	0	0.0	2
QLD86z352	15-Apr-86	RRD	Ross River Dam	Vl?sp	0.355	0.032	9.0	0	0	0	0.0	1
QLD86z353	6-May-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.064	9.1	0	0	0	0.0	2
QLD86z354	13-May-86	RRD	Ross River Dam	Vl?sp	0.700	0.050	7.1	0	0	0	0.0	2
QLD86z355	3-Jun-86	IBG	Ingham Botanical	Vl?sp	0.700	0.022	3.1	0	0	0	0.0	2
QLD86z356	10-Jun-86	RRD	Ross River Dam	Vl?sp	0.700	0.064	9.2	0	0	0	0.0	2
QLD86z357	17-Jun-86	FWCk	Freshwater Creek	Vl?sp	0.096	0.007	7.6	0	0	0	0.0	1
QLD86z358	1-Jul-86	IBG	Ingham Botanical	Vl?sp	0.350	0.031	8.8	0	0	0	0.0	1
QLD86z359	14-Jul-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.062	8.9	0	0	0	0.0	2
QLD86z360	21-Jul-86	RRD	Ross River Dam	Vl?sp	0.700	0.040	5.7	0	0	0	0.0	2
QLD86z361	18-Aug-86	FWCk	Freshwater Creek	Vl?sp	0.350	0.022	6.2	0	0	0	0.0	1
QLD86z362	25-Aug-86	RRD	Ross River Dam	Vl?sp	0.700	0.042	6.0	0	0	0	0.0	2
QLD86z363	7-Sep-86	IBG	Ingham Botanical	Vl?sp	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z364	16-Sep-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.049	6.9	0	0	0	0.0	2
QLD86z365	29-Sep-86	RRD	Ross River Dam	Vl?sp	0.700	0.037	5.3	0	0	0	0.0	2
QLD86z366	14-Oct-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.056	8.1	0	0	0	0.0	2
QLD86z367	27-Oct-86	RRD	Ross River Dam	Vl?sp	0.700	0.052	7.4	0	0	0	0.0	2
QLD86z368	3-Nov-86	IBG	Ingham Botanical	Vl?sp	0.700	0.065	9.3	0	0	0	0.0	2
QLD86z369	17-Nov-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.048	6.8	0	0	0	0.0	2
QLD86z370	1-Dec-86	RRD	Ross River Dam	Vl?sp	0.700	0.040	5.7	0	0	0	0.0	2
QLD86z371	7-Dec-86	IBG	Ingham Botanical	Vl?sp	0.700	0.097	13.8	0	0	0	0.0	2
QLD86z372	15-Dec-86	FWCk	Freshwater Creek	Vl?sp	0.700	0.053	7.6	0	0	0	0.0	2
QLD86z401	13-May-86	RRD	Ross River Dam	Pttr	0.700	0.060	8.6	0	0	0	0.0	2
QLD86z402	27-May-86	KC	Keelbottom Creek	Ptjv	0.360	0.020	5.6	0	0	0	0.0	1
QLD86z403	3-Jun-86	SR	Stone River	Pttr	0.350	0.015	4.3	0	0	0	0.0	1
QLD86z404	10-Jun-86	RRD	Ross River Dam	Pttr	0.350	0.031	8.8	0	0	0	0.0	1
QLD86z405	23-Jun-86	SC	Stuart Creek	Pttr	0.325	0.036	11.1	0	0	0	0.0	1
QLD86z406	30-Jun-86	KC	Keelbottom Creek	Ptjv	0.350	0.026	7.3	0	0	0	0.0	1
QLD86z407	21-Jul-86	RRD	Ross River Dam	Pttr	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z408	5-Aug-86	SC	Stuart Creek	Pttr	0.650	0.064	9.9	0	0	0	0.0	2
QLD86z409	25-Aug-86	RRD	Ross River Dam	Pttr	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z410	2-Sep-86	KC	Keelbottom Creek	Ptjv	0.360	0.030	8.4	0	0	0	0.0	1
QLD86z411	23-Sep-86	SC	Stuart Creek	Pttr	0.350	0.046	13.1	0	0	0	0.0	1

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD86z412	29-Sep-86	RRD	Ross River Dam	Pttr	0.350	0.022	6.4	0	0	0	0.0	1
QLD86z413	6-Oct-86	KC	Keelbottom Creek	Ptjv	0.700	0.075	10.7	0	0	0	0.0	2
QLD86z414	14-Oct-86	LPC	Liverpool Creek	Ptjv	0.350	0.032	9.2	0	0	0	0.0	1
QLD86z415	27-Oct-86	RRD	Ross River Dam	Pttr	0.350	0.027	7.8	0	0	0	0.0	1
QLD86z416	17-Nov-86	LPC	Liverpool Creek	Ptjv	0.230		0.0	0	0	0	0.0	1
QLD86z417	1-Dec-86	RRD	Ross River Dam	Pttr	0.700	0.053	7.6	0	0	0	0.0	2
QLD86z451	24-Feb-86	AVC	Avondale Creek	Cab	0.720	0.056	7.8	0	0	0	0.0	2
QLD86z452	26-Mar-86	AVC	Avondale Creek	Cab	0.700	0.044	6.3	0	0	0	0.0	2
QLD86z453	18-Apr-86	AVC	Avondale Creek	Cab	0.370	0.034	9.2	0	0	0	0.0	1
QLD86z454	6-May-86	AVC	Avondale Creek	Cab	0.355	0.018	5.1	0	0	0	0.0	1
QLD86z455	17-Jun-86	AVC	Avondale Creek	Cab	0.350	0.027	7.6	0	0	0	0.0	1
QLD86z501	29-Jan-86	LHC	Leichhardt Creek	Myvr	0.356	0.027	7.6	0	0	0	0.0	1
QLD86z502	3-Jun-86	LHC	Leichhardt Creek	Myvr	0.350	0.018	5.1	0	0	0	0.0	1
QLD86z503	17-Jun-86	HC	Harvey Creek	Mytr	0.350	0.043	12.4	0	0	0	0.0	1
QLD86z504	14-Jul-86	HC	Harvey Creek	Mytr	0.350	0.028	8.1	0	0	0	0.0	1
QLD86z505	18-Aug-86	HC	Harvey Creek	Mytr	0.350	0.035	10.1	0	0	0	0.0	1
QLD86z506	7-Sep-86	LHC	Leichhardt Creek	Myvr	0.350	0.022	6.3	0	0	0	0.0	1
QLD86z507	16-Sep-86	HC	Harvey Creek	Mytr	0.350	0.036	10.3	0	0	0	0.0	1
QLD86z508	14-Oct-86	HC	Harvey Creek	Mytr	0.350	0.023	6.6	0	0	0	0.0	1
QLD86z509	17-Nov-86	HC	Harvey Creek	Mytr	0.700	0.052	7.4	0	0	0	0.0	2
QLD86z510	15-Dec-86	HC	Harvey Creek	Mytr	0.350	0.037	10.6	0	0	0	0.0	1
QLD86z551	21-Jan-86	RRD	Ross River Dam	Cer	0.720	0.050	6.9	0	0	0	0.0	2
QLD86z552	28-Jan-86	AR	Alice River	Cer	0.790	0.042	5.3	0	0	0	0.0	2
QLD86z553	18-Feb-86	GP	Goosepond Creek	Cer	1.010	0.058	5.7	0	0	0	0.0	3
QLD86z554	25-Feb-86	CL	Centenary Lake	Cer	0.710	0.054	7.6	0	0	0	0.0	2
QLD86z555	10-Mar-86	AR	Alice River	Cer	0.705	0.040	5.7	0	0	0	0.0	2
QLD86z556	17-Mar-86	LC	Louisa Creek	Cer	0.365	0.018	4.9	0	0	0	0.0	1
QLD86z557	26-Mar-86	CL	Centenary Lake	Cer	0.705	0.038	5.4	0	0	0	0.0	2
QLD86z558	15-Apr-86	RRD	Ross River Dam	Cer	0.700	0.042	6.0	0	0	0	0.0	2
QLD86z559	18-Apr-86	CL	Centenary Lake	Cer	0.350	0.024	6.9	0	0	0	0.0	1
QLD86z560	30-Apr-86	AR	Alice River	Cer	0.355	0.024	6.8	0	0	0	0.0	1
QLD86z561	6-May-86	CL	Centenary Lake	Cer	0.705	0.058	8.2	0	0	0	0.0	2
QLD86z562	13-May-86	RRD	Ross River Dam	Cer	0.695	0.038	5.5	0	0	0	0.0	2
QLD86z563	19-May-86	LC	Louisa Creek	Cer	0.700	0.044	6.3	0	0	0	0.0	2
QLD86z564	27-May-86	AR	Alice River	Cer	0.350	0.036	10.3	0	0	0	0.0	2
QLD86z565	3-Jun-86	CC	Cattle Creek	Cer	0.350	0.021	6.0	0	0	0	0.0	1
QLD86z566	10-Jun-86	RRD	Ross River Dam	Cer	0.700	0.046	6.6	0	0	0	0.0	2
QLD86z567	17-Jun-86	CL	Centenary Lake	Cer	0.350	0.022	6.4	0	0	0	0.0	1
QLD86z568	30-Jun-86	AR	Alice River	Cer	0.350	0.026	7.5	0	0	0	0.0	1
QLD86z569	1-Jul-86	CC	Cattle Creek	Cer	0.350	0.024	7.0	0	0	0	0.0	1
QLD86z570	14-Jul-86	CL	Centenary Lake	Cer	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z571	21-Jul-86	RRD	Ross River Dam	Cer	0.700	0.044	6.3	0	0	0	0.0	2
QLD86z572	28-Jul-86	CC	Cattle Creek	Cer	0.700	0.053	7.5	0	0	0	0.0	2
QLD86z573	29-Jul-86	AR	Alice River	Cer	0.350	0.031	8.9	0	0	0	0.0	1
QLD86z574	5-Aug-86	SC	Stuart Creek	Cer	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z575	18-Aug-86	CL	Centenary Lake	Cer	0.350	0.029	8.3	0	0	0	0.0	1
QLD86z576	25-Aug-86	RRD	Ross River Dam	Cer	0.350	0.023	6.6	0	0	0	0.0	1
QLD86z577	2-Sep-86	AR	Alice River	Cer	0.360	0.020	5.5	0	0	0	0.0	1
QLD86z578	7-Sep-86	CC	Cattle Creek	Cer	0.700	0.067	9.5	0	0	0	0.0	2
QLD86z579	16-Sep-86	CL	Centenary Lake	Cer	0.700	0.046	6.6	0	0	0	0.0	2
QLD86z580	20-Sep-86	GP	Goosepond Creek	Cer	0.700	0.043	6.1	0	0	0	0.0	2
QLD86z581	23-Sep-86	SC	Stuart Creek	Cer	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z582	29-Sep-86	RRD	Ross River Dam	Cer	0.700	0.053	7.5	0	0	0	0.0	2
QLD86z583	6-Oct-86	AR	Alice River	Cer	0.350	0.026	7.3	0	0	0	0.0	1
QLD86z584	14-Oct-86	CL	Centenary Lake	Cer	0.700	0.045	6.4	0	0	0	0.0	2
QLD86z585	21-Oct-86	LC	Louisa Creek	Cer	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z586	21-Oct-86	SC	Stuart Creek	Cer	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z587	27-Oct-86	RRD	Ross River Dam	Cer	0.700	0.054	7.7	0	0	0	0.0	2
QLD86z588	3-Nov-86	CC	Cattle Creek	Cer	0.700	0.050	7.2	0	0	0	0.0	2

QLD86z589	10-Nov-86	AR	Alice River	Cer	0.700	0.056	7.9	0	0	0	0.0	2
QLD86z590	17-Nov-86	CL	Centenary Lake	Cer	0.350	0.027	7.7	0	0	0	0.0	1
QLD86z591	24-Nov-86	LC	Louisa Creek	Cer	0.350	0.032	9.2	0	0	0	0.0	1
QLD86z592	24-Nov-86	SC	Stuart Creek	Cer	0.350	0.020	5.6	0	0	0	0.0	1
QLD86z593	1-Dec-86	RRD	Ross River Dam	Cer	0.700	0.047	6.7	0	0	0	0.0	2
QLD86z594	7-Dec-86	CC	Cattle Creek	Cer	0.700	0.068	9.6	0	0	0	0.0	2
QLD86z595	15-Dec-86	CL	Centenary Lake	Cer	0.700	0.046	6.6	0	0	0	0.0	2
QLD86z601	13-Jan-86	RRD	Ross River Dam	Naj	0.715	0.047	6.6	0	0	0	0.0	2
QLD86z602	21-Jan-86	RRD	Ross River Dam	Naj	0.735	0.050	6.8	0	0	0	0.0	2
QLD86z603	28-Jan-86	AR	Alice River	Naj	0.685	0.055	8.0	0	0	0	0.0	2
Qld86z604	6-Feb-86	RRD	Ross River Dam	Naj	0.360	0.024	6.7	0	3	3	8.3	1
QLD86z605	12-Feb-86	RRD	Ross River Dam	Naj	0.780	0.068	8.7	0	0	0	0.0	2
QLD86z606	18-Feb-86	GP	Goosepond Creek	Naj	0.650	0.040	6.2	0	0	0	0.0	2
QLD86z607	4-Mar-86	RRD	Ross River Dam	Naj	1.050	0.088	8.4	0	0	0	0.0	3
QLD86z608	11-Mar-86	RRD	Ross River Dam	Naj	0.705	0.050	7.1	0	0	0	0.0	2
QLD86z609	27-Mar-86	RRD	Ross River Dam	Naj	0.100	0.008	8.0	0	0	0	0.0	1
QLD86z610	15-Apr-86	RRD	Ross River Dam	Naj	0.705	0.060	8.5	0	0	0	0.0	2
QLD86z611	30-Apr-86	KB	Keelbottom Billa	Naj	0.720	0.060	8.3	0	0	0	0.0	2
QLD86z612	30-Apr-86	AR	Alice River	Naj	0.360	0.022	6.1	0	0	0	0.0	1
QLD86z613	13-May-86	RRD	Ross River Dam	Naj	0.700	0.050	7.1	0	0	0	0.0	2
QLD86z614	19-May-86	BP#2	Borrow Pit #2	Naj	0.700	0.072	10.3	0	0	0	0.0	2
QLD86z615	27-May-86	KB	Keelbottom Billa	Naj	0.345	0.030	8.7	0	0	0	0.0	1
QLD86z616	3-Jun-86	SR	Stone River	Naj	0.350	0.018	5.1	0	0	0	0.0	1
QLD86z617	3-Jun-86	LHC	Leichhardt Creek	Naj	0.230	0.022	9.6	0	0	0	0.0	1
QLD86z618	10-Jun-86	RRD	Ross River Dam	Naj	0.600	0.041	6.9	0	0	0	0.0	2
QLD86z619	10-Jun-86	BP#2	Borrow Pit #2	Naj	0.350	0.032	9.1	0	0	0	0.0	1
QLD86z620	30-Jun-86	AR	Alice River	Naj	0.350	0.035	10.0	0	0	0	0.0	1
QLD86z621	21-Jul-86	RRD	Ross River Dam	Naj	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z622	29-Jul-86	AR	Alice River	Naj	0.350	0.025	7.2	0	0	0	0.0	1
QLD86z623	25-Aug-86	RRD	Ross River Dam	Naj	0.700	0.043	6.1	0	0	0	0.0	2
QLD86z624	2-Sep-86	AR	Alice River	Naj	0.360	0.029	8.2	0	0	0	0.0	1
QLD86z625	7-Sep-86	CC	Cattle Creek	Naj	0.245	0.014	5.7	0	0	0	0.0	1
QLD86z626	29-Sep-86	RRD	Ross River Dam	Naj	0.700	0.045	6.4	0	0	0	0.0	2
QLD86z627	6-Oct-86	AR	Alice River	Naj	0.700	0.065	9.3	0	0	0	0.0	2
QLD86z628	27-Oct-86	RRD	Ross River Dam	Naj	0.350	0.023	6.6	0	0	0	0.0	1
QLD86z629	10-Nov-86	KB	Keelbottom Billa	Naj	0.600	0.049	8.1	0	0	0	0.0	2
QLD86z630	10-Nov-86	AR	Alice River	Naj	0.350	0.038	10.9	0	0	0	0.0	1
QLD86z631	1-Dec-86	RRD	Ross River Dam	Naj	0.700	0.051	7.2	0	0	0	0.0	2
QLD86z650	18-Apr-86	CL	Centenary Lake	Utr	0.350	0.012	3.4	0	0	0	0.0	1
QLD86z651	30-Apr-86	KB	Keelbottom Billa	Nit	0.350	0.042	12.0	0	0	0	0.0	1
QLD86z652	6-May-86	CL	Centenary Lake	Utr	0.350	0.026	7.4	0	0	0	0.0	1
QLD86z653	27-May-86	KB	Keelbottom Billa	Cha	0.175	0.016	9.1	0	0	0	0.0	1
QLD86z654	3-Jun-86	CC	Cattle Creek	Utr	0.350	0.012	3.4	0	0	0	0.0	1
QLD86z655	3-Jun-86	LHC	Leichhardt Creek	Cha	0.350	0.011	3.1	0	0	0	0.0	1
QLD86z656	10-Jun-86	RRD	Ross River Dam	Cha	0.350	0.045	12.9	0	0	0	0.0	1
QLD86z657	17-Jun-86	CL	Centenary Lake	Utr	0.350	0.015	4.4	0	0	0	0.0	1
QLD86z658	17-Jun-86	CC	Cattle Creek	Utr	0.700	0.042	6.1	0	0	0	0.0	2
QLD86z659	30-Jun-86	KB	Keelbottom Billa	Cha	0.350	0.033	9.5	0	0	0	0.0	1
QLD86z660	1-Jul-86	CC	Cattle Creek	Utr	0.350	0.015	4.3	0	0	0	0.0	1
QLD86z661	13-Jul-86	CC	Cattle Creek	Utr	0.360	0.025	6.8	0	0	0	0.0	1
QLD86z662	14-Jul-86	CL	Centenary Lake	Utr	0.360	0.019	5.3	0	0	0	0.0	1
QLD86z663	21-Jul-86	RRD	Ross River Dam	Cha	0.705	0.077	10.9	0	0	0	0.0	2
QLD86z664	28-Jul-86	CC	Cattle Creek	Utr	0.350	0.012	3.5	0	0	0	0.0	1
QLD86z665	18-Aug-86	FWCk	Freshwater Creek	Cyp	0.350	0.054	15.5	0	0	0	0.0	1
QLD86z666	18-Aug-86	CL	Centenary Lake	Utr	0.350	0.026	7.5	0	0	0	0.0	1
QLD86z667	7-Sep-86	CC	Cattle Creek	Utr	0.300	0.019	6.3	0	0	0	0.0	1
QLD86z668	6-Oct-86	KC	Keelbottom Creek	Nit	0.350	0.035	10.0	0	0	0	0.0	1
QLD86z669	6-Oct-86	AR	Alice River	Cha	0.350	0.040	11.4	0	0	0	0.0	1
QLD86z670	10-Nov-86	AR	Alice River	Cha	0.700	0.071	10.2	0	0	0	0.0	2
QLD86z701	13-Jan-86	RRD	Ross River Dam	Ndin	0.720	0.066	9.2	0	0	0	0.0	2
QLD86z702	21-Jan-86	RRD	Ross River Dam	Ndin	1.130	0.090	8.0	0	0	0	0.0	3

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD86z703	6-Feb-86	RRD	Ross River Dam	Ndin	0.730	0.060	8.2	0	0	0	0.0	2
QLD86z704	12-Feb-86	RRD	Ross River Dam	Ndin	0.675	0.050	7.4	0	0	0	0.0	2
QLD86z705	18-Feb-86	PP	Palmetum Pond	Nygi	0.390	0.038	9.7	0	0	0	0.0	1
QLD86z706	21-Feb-86	RRD	Ross River Dam	Ndin	0.350	0.032	9.1	0	0	0	0.0	1
QLD86z707	4-Mar-86	RRD	Ross River Dam	Ndin	0.700	0.066	9.4	0	0	0	0.0	2
QLD86z708	17-Mar-86	LC	Louisa Creek	Nygi	0.350	0.058	16.6	0	0	0	0.0	1
QLD86z709	27-Mar-86	RRD	Ross River Dam	Ndin	0.720	0.066	9.2	0	0	0	0.0	2
QLD86z710	15-Apr-86	RRD	Ross River Dam	Ndin	0.705	0.072	10.2	0	0	0	0.0	2
QLD86z711	13-May-86	RRD	Ross River Dam	Ndin	0.350	0.028	8.0	0	0	0	0.0	1
QLD86z712	19-May-86	LC	Louisa Creek	Nygi	0.350	0.020	5.7	0	0	0	0.0	1
QLD86z713	10-Jun-86	RRD	Ross River Dam	Ndin	0.350	0.037	10.6	0	0	0	0.0	1
QLD86z714	21-Jul-86	RRD	Ross River Dam	Ndin	0.350	0.035	10.0	0	0	0	0.0	1
QLD86z715	25-Aug-86	RRD	Ross River Dam	Ndin	0.350	0.043	12.2	0	0	0	0.0	1
QLD86z716	29-Sep-86	RRD	Ross River Dam	Ndin	0.350	0.042	12.0	0	0	0	0.0	1
QLD86z717	27-Oct-86	RRD	Ross River Dam	Ndin	0.350	0.036	10.3	0	0	0	0.0	1
QLD86z718	3-Nov-86	CC	Cattle Creek	Nygi	0.350	0.042	12.0	0	0	0	0.0	1
QLD86z719	1-Dec-86	RRD	Ross River Dam	Ndin	0.350	0.031	8.9	0	0	0	0.0	1
QLD86z720	7-Dec-86	CC	Cattle Creek	Nygi	0.350	0.039	11.2	0	0	0	0.0	1
QLD86z721	7-Dec-86	CC	Cattle Creek	Ndin	0.350	0.037	10.6	0	0	0	0.0	1
QLD86z801	28-Jan-86	AR	Alice River	Mar	0.765	0.077	10.1	0	0	0	0.0	2
QLD86z802	28-Jan-86	AR	Alice River	Pol	0.350	0.050	14.3	0	0	0	0.0	1
QLD86z803	28-Jan-86	AR	Alice River	Typ	0.335	0.032	9.6	0	0	0	0.0	1
QLD86z804	28-Jan-86	AR	Alice River	Ldpp	0.350	0.050	14.3	0	0	0	0.0	1
QLD86z805	12-Feb-86	AR	Alice River	Mar	0.390	0.036	9.2	0	0	0	0.0	1
QLD86z806	24-Feb-86	AVC	Avondale Creek	Mon	0.355	0.054	15.2	0	0	0	0.0	1
QLD86z807	4-Mar-86	RRD	Ross River Dam	Ldpp	0.700	0.066	9.4	0	0	0	0.0	2
QLD86z808	4-Mar-86	AR	Alice River	Mar	0.350	0.034	9.7	0	0	0	0.0	1
QLD86z809	10-Mar-86	AR	Alice River	Mar	0.600	0.100	16.7	0	0	0	0.0	2
QLD86z810	17-Mar-86	LC	Louisa Creek	Mon	0.350	0.030	8.6	0	0	0	0.0	1
QLD86z811	26-Mar-86	AVC	Avondale Creek	Mon	0.335	0.030	9.0	0	0	0	0.0	1
QLD86z812	2-Apr-86	AR	Alice River	Mar	0.245	0.032	13.1	0	0	0	0.0	1
QLD86z813	2-Apr-86	AR	Alice River	Ldpp	0.360	0.044	12.2	0	0	0	0.0	1
QLD86z814	18-Apr-86	AVC	Avondale Creek	Mon	0.350	0.018	5.1	0	0	0	0.0	1
QLD86z815	18-Apr-86	AVC	Avondale Creek	Ldhs	0.350	0.035	10.0	0	0	0	0.0	1
QLD86z816	30-Apr-86	AR	Alice River	Mar	0.240	0.032	13.3	0	0	0	0.0	1
QLD86z817	6-May-86	AVC	Avondale Creek	Mon	0.345	0.026	7.5	0	0	0	0.0	1
QLD86z818	27-May-86	AR	Alice River	Mar	0.350	0.040	11.4	0	0	0	0.0	1
QLD86z819	17-Jun-86	AVC	Avondale Creek	Ldhs	0.350	0.077	22.0	0	0	0	0.0	1
QLD86z820	25-Jun-86	BP#2	Borrow Pit #2	Elc	0.705	0.171	24.2	0	0	0	0.0	2
QLD86z821	30-Jun-86	AR	Alice River	Mar	0.190	0.020	10.8	0	0	0	0.0	1
QLD86z822	29-Jul-86	AR	Alice River	Mar	0.350	0.043	12.2	0	0	0	0.0	1
QLD86z823	29-Jul-86	AR	Alice River	Cpt	0.350	0.038	10.9	0	0	0	0.0	1
QLD86z824	29-Jul-86	AR	Alice River	Ldpp	0.350	0.028	8.1	0	0	0	0.0	1
QLD86z825	18-Aug-86	AVC	Avondale Creek	Mar	0.350	0.039	11.1	0	0	0	0.0	1
QLD86z826	2-Sep-86	AR	Alice River	Mar	0.360	0.041	11.3	0	0	0	0.0	1
QLD86z827	7-Sep-86	LHC	Leichhardt Creek	Vil	0.695	0.053	7.6	0	0	0	0.0	2
QLD86z828	23-Sep-86	SC	Stuart Creek	Mar	0.350	0.033	9.3	0	0	0	0.0	1
QLD86z829	23-Sep-86	BP#2	Borrow Pit #2	Elc	0.350	0.049	14.0	0	0	0	0.0	1
QLD86z830	6-Oct-86	AR	Alice River	Mar	0.350	0.054	15.4	0	0	0	0.0	1
QLD86z831	21-Oct-86	LC	Louisa Creek	Mar	0.350	0.038	10.9	0	0	0	0.0	1
QLD86z832	21-Oct-86	SC	Stuart Creek	Mar	0.350	0.020	5.8	0	0	0	0.0	1
QLD86z833	10-Nov-86	AR	Alice River	Mar	0.350	0.030	8.7	0	0	0	0.0	1
QLD86z834	24-Nov-86	BP#2	Borrow Pit #2	Elc	0.350	0.049	14.0	0	0	0	0.0	1
QLD86z835	24-Nov-86	LC	Louisa Creek	Mon	0.350	0.022	6.2	0	0	0	0.0	1
QLD86z836	24-Nov-86	LC	Louisa Creek	Mar	0.350	0.021	6.0	0	0	0	0.0	1
QLD86z837	7-Dec-86	CC	Cattle Creek	Mar	0.250	0.019	7.6	0	0	0	0.0	1
QLD86z901	29-Jul-86	AR	Alice River	Ler	0.350	0.071	20.3	0	0	0	0.0	1
QLD86z902	1-Sep-86	WC	Whitfield Creek	Phl	0.720	0.061	8.4	0	0	0	0.0	2
QLD87z101	6-Jan-87	CC	Cattle Creek	Eic	0.350	0.035	10.0	0	0	0	0.0	1

QLD87z102	27-Jan-87	LC	Louisa Creek	Pis	0.700	0.073	10.4	0	0	0	0.0	2
QLD87z103	27-Jan-87	LC	Louisa Creek	Sal	0.700	0.043	6.1	0	0	0	0.0	2
QLD87z104	2-Mar-87	CC	Cattle Creek	Eic	0.350	0.030	8.6	0	0	0	0.0	1
QLD87z106	15-Jun-87	AR	Alice River	Azo	0.600	0.034	5.7	0	0	0	0.0	2
QLD87z107	6-Jul-87	AR	Alice River	Azo	0.350	0.024	6.9	0	0	0	0.0	2
QLD87z108	27-Oct-87	RRB	Ross River Bridg	Eic	0.350	0.023	6.6	0	0	0	0.0	1
QLD87z150	27-Jan-87	LC	Louisa Creek	Otov	0.350	0.023	6.6	0	0	0	0.0	1
QLD87z151	17-Feb-87	FWCk	Freshwater Creek	Bloc	0.350	0.042	12.0	0	0	0	0.0	1
QLD87z152	17-Feb-87	HC	Harvey Creek	Bloc	0.700	0.065	9.3	0	0	0	0.0	2
QLD87z153	17-Mar-87	FWCk	Freshwater Creek	Bloc	0.350	0.039	11.1	0	0	0	0.0	1
QLD87z154	17-Mar-87	HC	Harvey Creek	Bloc	0.700	0.074	10.6	0	0	0	0.0	2
QLD87z155	14-Apr-87	FWCk	Freshwater Creek	Bloc	0.350	0.031	8.9	0	0	0	0.0	1
QLD87z156	14-Apr-87	HC	Harvey Creek	Bloc	0.700	0.098	14.0	0	0	0	0.0	2
QLD87z157	14-Apr-87	DBC	Double Barrel Cr	Bloc	0.700	0.057	8.1	0	0	0	0.0	2
QLD87z158	4-May-87	FWCK	Freshwater Creek	Bloc	0.350	0.042	12.0	0	0	0	0.0	1
QLD87z159	4-May-87	HC	Harvey Creek	Bloc	0.350	0.036	10.3	0	0	0	0.0	1
QLD87z160	4-May-87	DBC	Double Barrel Cr	Bloc	0.350	0.022	6.3	0	0	0	0.0	1
QLD87z161	25-May-87	FWCk	Freshwater Creek	Bloc	0.350	0.045	12.9	0	0	0	0.0	1
QLD87z162	25-May-87	HC	Harvey Creek	Bloc	1.050	0.095	9.0	0	0	0	0.0	3
QLD87z163	25-May-87	WC	Whitfield Creek	Bloc	0.700	0.058	8.3	0	0	0	0.0	2
QLD87z164	21-Jun-87	DBC	Double Barrel Cr	Bloc	1.050	0.075	7.2	0	0	0	0.0	3
QLD87z165	30-Jun-87	HC	Harvey Creek	Bloc	0.700	0.062	8.9	0	0	0	0.0	2
QLD87z166	30-Jun-87	DBC	Double Barrel Cr	Bloc	1.050	0.086	8.2	0	0	0	0.0	3
QLD87z167	30-Jun-87	WC	Whitfield Creek	Bloc	0.700	0.063	9.0	0	0	0	0.0	2
QLD87z168	13-Jul-87	HC	Harvey Creek	Bloc	0.700	0.071	10.1	0	0	0	0.0	2
QLD87z169	13-Jul-87	WC	Whitfield Creek	Bloc	0.700	0.075	10.7	0	0	0	0.0	2
QLD87z170	20-Jul-87	DBC	Double Barrel Cr	Bloc	1.050	0.061	5.8	0	0	0	0.0	3
QLD87z171	20-Jul-87	WC	Whitfield Creek	Bloc	0.700	0.060	8.6	0	0	0	0.0	2
QLD87z172	3-Aug-87	FWCk	Freshwater Creek	Bloc	0.350	0.028	8.0	0	0	0	0.0	1
QLD87z173	3-Aug-87	DBC	Double Barrel Cr	Bloc	0.350	0.022	6.3	0	0	0	0.0	1
QLD87z174	21-Aug-87	FWCk	Freshwater Creek	Bloc	0.350	0.026	7.4	0	0	0	0.0	1
QLD87z175	21-Aug-87	HC	Harvey Creek	Bloc	1.050	0.078	7.4	0	0	0	0.0	3
QLD87z176	21-Aug-87	WC	Whitfield Creek	Bloc	0.350	0.032	9.1	0	0	0	0.0	1
QLD87z177	15-Sep-87	FWCk	Freshwater Creek	Bloc	0.350	0.032	9.1	0	0	0	0.0	1
QLD87z178	15-Sep-87	HC	Harvey Creek	Bloc	0.350	0.027	7.7	0	0	0	0.0	1
QLD87z179	28-Sep-87	FWCk	Freshwater Creek	Bloc	0.350	0.033	9.4	0	0	0	0.0	1
QLD87z180	28-Sep-87	HC	Harvey Creek	Bloc	0.700	0.061	8.7	0	0	0	0.0	2
QLD87z181	13-Oct-87	FWCk	Freshwater Creek	Bloc	0.700	0.076	10.9	0	0	0	0.0	2
QLD87z182	13-Oct-87	HC	Harvey Creek	Bloc	0.700	0.054	7.7	0	0	0	0.0	2
QLD87z201	6-Jan-87	IBG	Ingham Botanical	Hyd	0.350	0.031	8.9	0	0	0	0.0	1
QLD87z202	6-Jan-87	CC	Cattle Creek	Hyd	0.350	0.033	9.4	0	0	0	0.0	1
QLD87z203	12-Jan-87	KC	Keelbottom Creek	Hyd	0.700	0.076	10.8	0	2	2	2.9	2
QLD87z204	12-Jan-87	KB	Keelbottom Billa	Hyd	0.700	0.078	11.1	0	0	0	0.0	2
QLD87z205	12-Jan-87	AR	Alice River	Hyd	0.700	0.070	10.0	0	0	0	0.0	2
QLD87z206	19-Jan-87	RRD	Ross River Dam	Hyd	0.700	0.066	9.4	1	0	1	1.4	2
QLD87z207	27-Jan-87	BP#2	Borrow Pit #2	Hyd	0.700	0.052	7.4	0	0	0	0.0	2
QLD87z208	30-Jan-87	BR#2	Bohle River#2	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD87z209	17-Feb-87	FWCk	Freshwater Creek	Hyd	0.700	0.072	10.3	0	0	0	0.0	2
QLD87z210	17-Feb-87	CL	Centenary Lake	Hyd	0.700	0.061	8.7	0	0	0	0.0	2
QLD87z211	23-Feb-87	RRD	Ross River Dam	Hyd	1.000	0.078	7.8	0	0	0	0.0	3
QLD87z212	2-Mar-87	IBG	Ingham Botanical	Hyd	0.700	0.059	8.4	0	0	0	0.0	2
QLD87z213	9-Mar-87	AR	Alice River	Hyd	1.050	0.082	7.8	0	0	0	0.0	3
QLD87z214	9-Mar-87	SC	Stuart Creek	Hyd	0.700	0.053	7.6	0	0	0	0.0	2
QLD87z215	17-Mar-87	CL	Centenary Lake	Hyd	0.700	0.049	7.0	0	0	0	0.0	2
QLD87z216	17-Mar-87	FWCk	Freshwater Creek	Hyd	1.050	0.106	10.1	0	0	0	0.0	3
QLD87z217	6-Apr-87	RRD	Ross River Dam	Hyd	1.050	0.074	7.0	0	0	0	0.0	3
QLD87z218	6-Apr-87	RRD	Ross River Dam	Hyd	0.700	0.081	11.6	2	4	6	8.6	2
QLD87z219	14-Apr-87	FWCk	Freshwater Creek	Hyd	1.050	0.127	12.0	0	0	0	0.0	3
QLD87z220	30-Apr-87	RRD	Ross River Dam	Hyd	1.050	0.098	9.3	0	0	0	0.0	3
QLD87z221	30-Apr-87	RRD	Ross River Dam	Hyd	0.350	0.039	11.1	7	63	70	200.0	1
QLD87z222	11-May-87	KC	Keelbottom Creek	Hyd	0.700	0.044	6.3	0	0	0	0.0	2

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD87z223	11-May-87	KB	Keelbottom Billa	Hyd	1.050	0.103	9.8	2	0	2	1.9	3
QLD87z224	19-May-87	IBG	Ingham Botanical	Hyd	0.650	0.046	7.1	0	0	0	0.0	2
QLD87z225	19-May-87	GPS	Garbutt Park Str	Hyd	1.050	0.060	5.7	0	0	0	0.0	3
QLD87z226	26-May-87	BR#2	Bohle River#2	Hyd	1.400	0.128	9.1	0	0	0	0.0	4
QLD87z227	1-Jun-87	BP#2	Borrow Pit #2	Hyd	1.400	0.109	7.8	0	0	0	0.0	4
QLD87z228	8-Jun-87	RRD	Ross River Dam	Hyd	1.050	0.136	13.0	0	0	0	0.0	3
QLD87z229	9-Jun-87	RRD	Ross River Dam	Hyd	0.700	0.055	7.9	5	8	13	18.6	2
QLD87z230	15-Jun-87	AR	Alice River	Hyd	1.050	0.099	9.4	0	0	0	0.0	3
QLD87z231	22-Jun-87	RRD	Ross River Dam	Hyd	0.700	0.074	10.6	0	0	0	0.0	2
QLD87z232	22-Jun-87	RRD	Ross River Dam	Hyd	0.700	0.063	9.0	19	29	48	68.6	2
QLD87z233	30-Jun-87	FWCk	Freshwater Creek	Hyd	0.700	0.084	12.0	0	0	0	0.0	2
QLD87z234	6-Jul-87	KC	Keelbottom Creek	Hyd	0.350	0.021	6.0	0	0	0	0.0	1
QLD87z235	6-Jul-87	KB	Keelbottom Billa	Hyd	0.650	0.038	5.8	0	0	0	0.0	2
QLD87z236	6-Jul-87	AR	Alice River	Hyd	0.700	0.048	6.9	2	4	6	8.6	2
QLD87z237	13-Jul-87	FWCk	Freshwater Creek	Hyd	0.700	0.058	8.3	0	0	0	0.0	2
QLD87z238	21-Jul-87	BP#2	Borrow Pit #2	Hyd	1.050	0.101	9.6	0	0	0	0.0	3
QLD87z239	27-Jul-87	RRD	Ross River Dam	Hyd	0.700	0.077	11.0	0	0	0	0.0	2
QLD87z240	27-Jul-87	RRD	Ross River Dam	Hyd	0.700	0.046	6.6	0	0	0	0.0	2
QLD87z241	2-Aug-87	TD	Lake Tinaroo	Hyd	0.700	0.055	7.9	0	0	0	0.0	2
QLD87z242	3-Aug-87	FWCk	Freshwater Creek	Hyd	1.050	0.092	8.8	0	0	0	0.0	3
QLD87z243	10-Aug-87	BP#2	Borrow Pit #2	Hyd	1.050	0.091	8.7	0	0	0	0.0	3
QLD87z244	10-Aug-87	BR#2	Bohle River#2	Hyd	1.050	0.131	12.5	0	0	0	0.0	3
QLD87z245	21-Aug-87	FWCk	Freshwater Creek	Hyd	1.050	0.066	6.3	0	0	0	0.0	3
QLD87z246	31-Aug-87	RRD	Ross River Dam	Hyd	1.050	0.091	8.7	0	0	0	0.0	3
QLD87z247	31-Aug-87	RRD	Ross River Dam	Hyd	0.350	0.031	8.9	0	0	0	0.0	1
QLD87z248	7-Sep-87	IBG	Ingham Botanical	Hyd	0.700	0.045	6.4	0	0	0	0.0	2
QLD87z249	15-Sep-87	FWCk	Freshwater Creek	Hyd	2.450	0.209	8.5	0	0	0	0.0	7
QLD87z250	27-Sep-87	TD	Lake Tinaroo	Hyd	0.700	0.043	6.1	0	0	0	0.0	2
QLD87z251	28-Sep-87	FWCk	Freshwater Creek	Hyd	0.700	0.070	10.0	0	0	0	0.0	2
QLD87z252	5-Oct-87	BP#2	Borrow Pit #2	Hyd	0.700	0.059	8.4	0	0	0	0.0	2
QLD87z253	5-Oct-87	BR#2	Bohle River#2	Hyd	1.050	0.099	9.4	0	0	0	0.0	3
QLD87z254	13-Oct-87	FWCk	Freshwater Creek	Hyd	1.750	0.145	8.3	0	0	0	0.0	5
QLD87z255	20-Oct-87	RRD	Ross River Dam	Hyd	0.350	0.046	13.1	0	0	0	0.0	1
QLD87z350	6-Jan-87	IBG	Ingham Botanical	Vl?sp	0.700	0.066	9.4	0	0	0	0.0	2
QLD87z351	19-Jan-87	RRD	Ross River Dam	Vl?sp	0.700	0.044	6.3	0	1	1	1.4	2
QLD87z352	23-Feb-87	RRD	Ross River Dam	Vl?sp	0.700	0.069	9.9	0	0	0	0.0	2
QLD87z353	2-Mar-87	IBG	Ingham Botanical	Vl?sp	1.050	0.103	9.8	0	0	0	0.0	3
QLD87z354	17-Mar-87	FWCk	Freshwater Creek	Vl?sp	0.350	0.035	10.0	0	0	0	0.0	1
QLD87z355	6-Apr-87	RRD	Ross River Dam	Vl?sp	0.700	0.070	10.0	0	6	6	8.6	2
QLD87z356	14-Apr-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.060	8.6	0	0	0	0.0	2
QLD87z357	30-Apr-87	RRD	Ross River Dam	Vl?sp	1.050	0.100	9.5	0	0	0	0.0	3
QLD87z358	4-May-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.050	7.1	0	0	0	0.0	2
QLD87z359	19-May-87	IBG	Ingham Botanical	Vl?sp	1.050	0.081	7.7	0	0	0	0.0	3
QLD87z360	25-May-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.075	10.7	0	0	0	0.0	2
QLD87z361	9-Jun-87	RRD	Ross River Dam	Vl?sp	0.700	0.068	9.7	0	22	22	31.4	2
QLD87z362	22-Jun-87	RRD	Ross River Dam	Vl?sp	0.700	0.057	8.1	1	12	13	18.6	2
QLD87z363	30-Jun-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.057	8.1	0	0	0	0.0	2
QLD87z364	13-Jul-87	FWCk	Freshwater Creek	Vl?sp	1.050	0.117	11.1	0	0	0	0.0	3
QLD87z365	2-Aug-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.056	8.0	0	0	0	0.0	2
QLD87z366	21-Aug-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.070	10.0	0	0	0	0.0	2
QLD87z367	7-Sep-87	IBG	Ingham Botanical	Vl?sp	1.050	0.151	14.4	0	0	0	0.0	3
QLD87z368	15-Sep-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.044	6.3	0	0	0	0.0	2
QLD87z369	28-Sep-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.050	7.1	0	0	0	0.0	2
QLD87z370	13-Oct-87	FWCk	Freshwater Creek	Vl?sp	0.700	0.073	10.4	0	0	0	0.0	2
QLD87z400	19-Jan-87	RRD	Ross River Dam	Pttr	0.620	0.058	9.4	0	0	0	0.0	2
QLD87z401	23-Feb-87	RRD	Ross River Dam	Pttr	0.350	0.033	9.4	0	0	0	0.0	1
QLD87z402	11-May-87	KC	Keelbottom Creek	Ptjv	0.335	0.026	7.8	0	0	0	0.0	1
QLD87z403	6-Jul-87	KC	Keelbottom Creek	Ptjv	0.350	0.025	7.1	0	0	0	0.0	1
QLD87z404	21-Sep-87	GP	Goosepond Creek	Ptcr	0.700	0.046	6.6	0	0	0	0.0	2

QLD87z405	27-Sep-87	TD	Lake Tinaroo	Pttr	0.700	0.042	6.0	0	0	0	0.0	2
QLD87z406	27-Oct-87	RRB	Ross River Bridg	Pttr	0.700	0.069	9.9	0	0	0	0.0	2
QLD87z501	17-Feb-87	HC	Harvey Creek	Mytr	0.700	0.068	9.7	0	0	0	0.0	2
QLD87z502	17-Mar-87	HC	Harvey Creek	Mytr	0.350	0.035	10.0	0	0	0	0.0	1
QLD87z503	14-Apr-87	HC	Harvey Creek	Mytr	0.350	0.032	9.1	0	0	0	0.0	1
QLD87z504	4-May-87	HC	Harvey Creek	Mytr	0.350	0.028	8.0	0	0	0	0.0	1
QLD87z505	7-Aug-87	HC	Harvey Creek	Mytr	1.050	0.086	8.2	0	0	0	0.0	3
QLD87z506	28-Sep-87	HC	Harvey Creek	Mytr	0.350	0.023	6.6	0	0	0	0.0	1
QLD87z507	13-Oct-87	HC	Harvey Creek	Mytr	0.350	0.026	7.4	0	0	0	0.0	1
QLD87z551	6-Jan-87	CC	Cattle Creek	Cer	0.700	0.060	8.6	0	0	0	0.0	2
QLD87z552	19-Jan-87	RRD	Ross River Dam	Cer	0.700	0.052	7.4	0	6	6	8.6	2
QLD87z553	23-Feb-87	CL	Centenary Lake	Cer	0.350	0.023	6.6	0	0	0	0.0	1
QLD87z554	2-Mar-87	CC	Cattle Creek	Cer	0.700	0.054	7.7	0	0	0	0.0	2
QLD87z555	9-Mar-87	AR	Alice River	Cer	0.700	0.040	5.7	0	0	0	0.0	2
QLD87z556	9-Mar-87	SC	Stuart Creek	Cer	0.700	0.045	6.4	0	0	0	0.0	2
QLD87z557	17-Mar-87	CL	Centenary Lake	Cer	0.700	0.044	6.3	0	0	0	0.0	2
QLD87z558	6-Apr-87	RRD	Ross River Dam	Cer	0.700	0.049	7.0	0	0	0	0.0	2
QLD87z559	14-Apr-87	CL	Centenary Lake	Cer	0.350	0.025	7.1	0	0	0	0.0	1
QLD87z560	30-Apr-87	RRD	Ross River Dam	Cer	0.700	0.044	6.3	0	0	0	0.0	2
QLD87z561	4-May-87	CL	Centenary Lake	Cer	0.350	0.018	5.1	0	0	0	0.0	1
QLD87z562	19-May-87	CC	Cattle Creek	Cer	0.700	0.035	5.0	0	0	0	0.0	2
QLD87z563	9-Jun-87	RRD	Ross River Dam	Cer	0.700	0.048	6.9	0	1	1	1.4	2
QLD87z564	15-Jun-87	AR	Alice River	Cer	0.700	0.047	6.7	0	0	0	0.0	2
QLD87z565	22-Jun-87	RRD	Ross River Dam	Cer	0.350	0.022	6.3	0	0	0	0.0	1
QLD87z566	30-Jun-87	CL	Centenary Lake	Cer	0.350	0.016	4.6	0	0	0	0.0	1
QLD87z567	6-Jul-87	AR	Alice River	Cer	0.350	0.019	5.4	0	0	0	0.0	1
QLD87z568	20-Jul-87	CC	Cattle Creek	Cer	0.350	0.016	4.6	0	0	0	0.0	1
QLD87z569	27-Jul-87	RRD	Ross River Dam	Cer	0.700	0.044	6.3	0	0	0	0.0	2
QLD87z570	3-Aug-87	CL	Centenary Lake	Cer	0.350	0.020	5.7	0	0	0	0.0	1
QLD87z571	10-Aug-87	AR	Alice River	Cer	0.350	0.018	5.1	0	0	0	0.0	1
QLD87z572	21-Aug-87	CL	Centenary Lake	Cer	0.700	0.036	5.1	0	0	0	0.0	2
QLD87z573	7-Sep-87	CC	Cattle Creek	Cer	1.400	0.084	6.0	0	0	0	0.0	4
QLD87z574	21-Sep-87	GP	Goosepond Creek	Cer	0.700	0.073	10.4	0	0	0	0.0	2
QLD87z575	20-Oct-87	RRD	Ross River Dam	Cer	1.050	0.073	7.0	0	2	2	1.9	3
QLD87z576	27-Oct-87	RRB	Ross River Bridg	Cer	0.350	0.025	7.1	0	0	0	0.0	1
QLD87z600	19-Jan-87	RRD	Ross River Dam	Naj	0.700	0.061	8.7	0	0	0	0.0	2
QLD87z601	23-Feb-87	RRD	Ross River Dam	Naj	0.700	0.061	8.7	0	0	0	0.0	2
QLD87z602	9-Mar-87	AR	Alice River	Naj	0.350	0.023	6.6	0	0	0	0.0	1
QLD87z603	6-Apr-87	RRD	Ross River Dam	Naj	0.700	0.062	8.9	2	0	2	2.9	2
QLD87z604	30-Apr-87	RRD	Ross River Dam	Naj	0.700	0.058	8.3	0	0	0	0.0	2
QLD87z605	11-May-87	KB	Keelbottom Billa	Naj	0.700	0.048	6.9	0	0	0	0.0	2
QLD87z606	9-Jun-87	RRD	Ross River Dam	Naj	0.700	0.062	8.9	0	0	0	0.0	2
QLD87z607	22-Jun-87	RRD	Ross River Dam	Naj	0.350	0.018	5.1	0	0	0	0.0	1
QLD87z608	27-Jul-87	RRD	Ross River Dam	Naj	0.700	0.046	6.6	0	0	0	0.0	2
QLD87z609	31-Aug-87	RRD	Ross River Dam	Naj	0.700	0.077	11.0	0	1	1	1.4	2
QLD87z610	20-Oct-87	RRD	Ross River Dam	Naj	0.350	0.034	9.7	7	0	7	20.0	1
QLD87z651	2-Mar-87	CC	Cattle Creek	Utr	0.700	0.028	4.0	0	0	0	0.0	2
QLD87z652	19-May-87	CC	Cattle Creek	Utr	0.700	0.024	3.4	0	0	0	0.0	2
QLD87z653	6-Jul-87	KC	Keelbottom Creek	Cha	0.350	0.017	4.9	0	0	0	0.0	1
QLD87z654	6-Jul-87	KC	Keelbottom Creek	Utr	0.350	0.009	2.6	0	0	0	0.0	1
QLD87z655	20-Jul-87	CC	Cattle Creek	Utr	0.350	0.013	3.7	0	0	0	0.0	1
QLD87z656	2-Aug-87	TD	Lake Tinaroo	Apo	0.700	0.043	6.1	0	0	0	0.0	2
QLD87z657	10-Aug-87	KC	Keelbottom Creek	Cha	0.700	0.072	10.3	0	0	0	0.0	2
QLD87z658	7-Sep-87	CC	Cattle Creek	Utr	1.050	0.045	4.3	0	0	0	0.0	3
QLD87z700	6-Jan-87	CC	Cattle Creek	Nygi	0.350	0.051	14.6	0	0	0	0.0	1
QLD87z701	6-Jan-87	CC	Cattle Creek	Ndin	0.350	0.040	11.4	0	0	0	0.0	1
QLD87z702	19-Jan-87	RRD	Ross River Dam	Ndin	0.350	0.041	11.7	0	0	0	0.0	1
QLD87z703	23-Feb-87	RRD	Ross River Dam	Ndin	0.350	0.037	10.6	0	0	0	0.0	1
QLD87z704	2-Mar-87	CC	Cattle Creek	Nygi	0.350	0.037	10.6	0	0	0	0.0	1
QLD87z705	2-Mar-87	CC	Cattle Creek	Ndin	0.350	0.032	9.1	0	0	0	0.0	1
QLD87z706	6-Apr-87	CC	Cattle Creek	Ndin	0.350	0.034	9.7	0	0	0	0.0	1

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD87z707	30-Apr-87	RRD	Ross River Dam	Ndin	0.350	0.036	10.3	0	0	0	0.0	1
QLD87z708	11-May-87	KB	Keelbottom Billa	Ndin	0.350	0.034	9.7	0	0	0	0.0	1
QLD87z709	9-Jun-87	RRD	Ross River Dam	Ndin	0.350	0.032	9.1	0	0	0	0.0	1
QLD87z710	22-Jun-87	RRD	Ross River Dam	Ndin	0.350	0.030	8.6	0	0	0	0.0	1
QLD87z711	27-Jul-87	RRD	Ross River Dam	Ndin	0.700	0.075	10.7	0	0	0	0.0	2
QLD87z712	10-Aug-87	BR#2	Bohle River#2	Nygi	0.350	0.040	11.4	0	0	0	0.0	1
QLD87z713	5-Oct-87	BR#2	Bohle River#2	Nygi	0.350	0.038	10.9	0	0	0	0.0	1
QLD87z714	20-Oct-87	RRD	Ross River Dam	Ndin	0.350	0.031	8.9	0	0	0	0.0	1
QLD87z715	27-Oct-87	RRB	Ross River Bridg	Ndin	0.700	0.072	10.3	0	0	0	0.0	2
QLD87z800	6-Jan-87	CC	Cattle Creek	Mar	0.350	0.034	9.7	0	0	0	0.0	1
QLD87z801	27-Jan-87	LC	Louisa Creek	Mon	0.350	0.027	7.7	0	0	0	0.0	1
QLD87z802	27-Jan-87	BP#2	Borrow Pit #2	Elc	0.665	0.080	12.0	0	0	0	0.0	2
QLD87z803	9-Mar-87	SC	Stuart Creek	Mar	0.700	0.064	9.1	0	0	0	0.0	2
QLD87z804	11-May-87	KB	Keelbottom Billa	Scr	0.350	0.076	21.7	0	0	0	0.0	1
QLD87z805	1-Jun-87	BP#2	Borrow Pit #2	Ipo	1.050	0.110	10.5	0	0	0	0.0	3
QLD87z806	21-Jul-87	BP#2	Borrow Pit #2	Ipo	0.350	0.044	12.6	0	0	0	0.0	1
QLD87z807	10-Aug-87	BP#2	Borrow Pit #2	Ipo	0.700	0.077	11.0	0	0	0	0.0	2
QLD87z808	5-Oct-87	BP#2	Borrow Pit #2	Ipo	0.700	0.076	10.9	0	0	0	0.0	2
QLD88L01	4-Apr-88	FWCk	Freshwater Creek				ERROR	0	0	0	ERROR	1
QLD88L02	4-May-88	FWCk	Freshwater Creek				ERROR	0	0	0	ERROR	1
QLD88L03	5-May-88	FWCk	Freshwater Creek				ERROR	0	0	0	ERROR	1
QLD88z100	18-Jul-88	AR	Alice River	Azo	0.350	0.018	5.1	0	0	0	0.0	1
QLD88z151	22-Mar-88	DBC	Double Barrel Cr	Bloc	0.700	0.060	8.6	0	0	0	0.0	2
QLD88z152	5-Apr-88	FWCk	Freshwater Creek	Bloc	0.700	0.075	10.7	0	0	0	0.0	2
QLD88z153	5-Apr-88	HC	Harvey Creek	Bloc	0.350	0.032	9.1	0	0	0	0.0	1
QLD88z154	5-Apr-88	DBC	Double Barrel Cr	Bloc	0.350	0.022	6.3	0	0	0	0.0	1
QLD88z155	4-Apr-88	BC	Barratt Creek	Bloc	0.700	0.052	7.4	0	0	0	0.0	2
QLD88z156	5-May-88	BC	Barratt Creek	Bloc	0.350	0.023	6.6	0	0	0	0.0	1
QLD88z157	6-May-88	FWCk	Freshwater Creek	Bloc	0.700	0.063	9.0	0	0	0	0.0	2
QLD88z158	6-May-88	HC	Harvey Creek	Bloc	0.350	0.027	7.7	0	0	0	0.0	1
QLD88z159	17-May-88	FWCk	Freshwater Creek	Bloc	0.700	0.078	11.1	0	0	0	0.0	2
QLD88z160	14-Jun-88	MC	Martins Creek	Bloc	0.350	0.024	6.9	0	0	0	0.0	1
QLD88z161	15-Jun-88	FWCk	Freshwater Creek	Bloc	0.350	0.028	8.0	0	0	0	0.0	1
QLD88z162	15-Jun-88	HC	Harvey Creek	Bloc	0.350	0.025	7.1	0	0	0	0.0	1
QLD88z163	30-Aug-88	FWCk	Freshwater Creek	Bloc	0.672	0.084	12.5	0	0	0	0.0	2
QLD88z164	30-Aug-88	HC	Harvey Creek	Bloc	0.924	0.073	7.9	0	0	0	0.0	3
QLD88z165	26-Sep-88	HC	Harvey Creek	Bloc	0.700	0.064	9.1	0	0	0	0.0	2
QLD88z166	8-Dec-88	FWCk	Freshwater Creek	Bloc	0.988	0.132	13.4	0	0	0	0.0	3
QLD88z201	24-Feb-88	RRD	Ross River Dam	Hyd	1.050	0.107	10.2	0	10	10	9.5	3
QLD88z202	14-Mar-88	BR#2	Bohle River#2	Hyd	1.750	0.101	5.8	0	0	0	0.0	5
QLD88z203	22-Mar-88	CL	Centenary Lake	Hyd	0.350	0.013	3.7	0	0	0	0.0	1
QLD88z204	22-Mar-88	QP	Quinns Pond	Hyd	0.700	0.042	6.0	0	0	0	0.0	2
QLD88z205	22-Mar-88	FWCk	Freshwater Creek	Hyd	0.350	0.037	10.6	0	0	0	0.0	1
QLD88z206	28-Mar-88	AR	Alice River	Hyd	1.050	0.054	5.1	0	0	0	0.0	3
QLD88z207	5-Apr-88	FWCk	Freshwater Creek	Hyd	0.700	0.080	11.4	0	0	0	0.0	2
QLD88z208	11-Apr-88	RRB	Ross River Bridg	Hyd	0.700	0.043	6.1	0	0	0	0.0	2
QLD88z209	18-Apr-88	BP#2	Borrow Pit #2	Hyd	1.050	0.072	6.9	0	0	0	0.0	3
QLD88z210	18-Apr-88	FWCk	Freshwater Creek	Hyd	1.050	0.163	15.5	0	0	0	0.0	3
QLD88z211	26-Apr-88	LC	Louisa Creek	Hyd	1.050	0.092	8.8	0	0	0	0.0	3
QLD88z212	3-May-88	BR#2	Bohle River#2	Hyd	1.050	0.092	8.8	0	0	0	0.0	3
QLD88z213	5-May-88	DR	Daintree River	Hyd	0.350	0.022	6.3	0	0	0	0.0	1
QLD88z214	6-May-88	FWCk	Freshwater Creek	Hyd	0.700	0.076	10.9	0	0	0	0.0	2
QLD88z215	17-May-88	AR	Alice River	Hyd	1.050	0.090	8.6	0	9	9	8.6	3
QLD88z216	17-May-88	FWCk	Freshwater Creek	Hyd	1.050	0.167	15.9	0	0	0	0.0	3
QLD88z217	26-May-88	FWCk	Freshwater Creek	Hyd	1.050	0.188	17.9	0	0	0	0.0	3
QLD88z218	30-May-88	IBG	Ingham Botanical	Hyd	0.350	0.033	9.4	0	0	0	0.0	1
QLD88z219	6-Jun-88	RRB	Ross River Bridg	Hyd	0.700	0.054	7.7	0	0	0	0.0	2
QLD88z220	14-Jun-88	MC	Martins Creek	Hyd	0.700	0.062	8.9	0	0	0	0.0	2
QLD88z221	15-Jun-88	FWCk	Freshwater Creek	Hyd	0.700	0.095	13.6	0	0	0	0.0	2

QLD88z222	27-Jun-88	BP#2	Borrow Pit #2	Hyd	1.400	0.066	4.7	0	0	0	0.0	4
QLD88z223	12-Jul-88	RRD	Ross River Dam	Hyd	1.050	0.092	8.8	0	0	0	0.0	2
QLD88z224	18-Jul-88	KC	Keelbottom Creek	Hyd	0.350	0.018	5.1	0	0	0	0.0	1
QLD88z225	18-Jul-88	AR	Alice River	Hyd	0.350	0.034	9.7	0	1	1	2.9	1
QLD88z226	18-Jul-88	FWCk	Freshwater Creek	Hyd	1.050	0.176	16.8	0	0	0	0.0	3
QLD88z227	30-Aug-88	FWCk	Freshwater Creek	Hyd	1.023	0.077	7.5	0	0	0	0.0	3
QLD88z228	12-Sep-88	RR	Ross River	Hyd	0.700	0.070	10.0	0	0	0	0.0	2
QLD88z229	17-Sep-88	FWCk	Freshwater Creek	Hyd			ERROR	0	0	0	ERROR	
QLD88z230	19-Sep-88	RRD	Ross River Dam	Hyd	1.050	0.078	7.4	0	0	0	0.0	3
QLD88z231	5-Dec-88	RRD	Ross River Dam	Hyd	1.050	0.084	8.0	0	0	0	0.0	3
QLD88z232	8-Dec-88	FWCk	Freshwater Creek	Hyd	0.405	0.052	12.8	0	0	0	0.0	1
QLD88z351	22-Mar-88	FWCk	Freshwater Creek	Vl?sp	1.050	0.082	7.8	0	0	0	0.0	[illegible]
QLD88z352	5-Apr-88	FWCk	Freshwater Creek	Vl?sp	0.700	0.058	8.3	0	0	0	0.0	2
QLD88z353	4-Apr-88	BC	Barratt Creek	Vlsp	0.700	0.045	6.4	0	0	0	0.0	2
QLD88z354	11-Apr-88	RRB	Ross River Bridg	Vl?sp	0.700	0.036	5.1	0	0	0	0.0	2
QLD88z355	18-Apr-88	FWCk	Freshwater Creek	Vl?sp	1.050	0.084	8.0	0	0	0	0.0	3
QLD88z356	5-May-88	DR	Daintree River	Vlsp	0.350	0.028	8.0	0	0	0	0.0	1
QLD88z357	6-May-88	FWCk	Freshwater Creek	Vl?sp	0.700	0.058	8.3	0	0	0	0.0	2
QLD88z358	17-May-88	FWCk	Freshwater Creek	Vl?sp	0.700	0.059	8.4	0	0	0	0.0	2
QLD88z359	26-May-88	FWCk	Freshwater Creek	Vl?sp	1.050	0.075	7.1	0	0	0	0.0	3
QLD88z360	30-May-88	IBG	Ingham Botanical	Vl?sp	0.700	0.066	9.4	0	0	0	0.0	2
QLD88z361	30-May-88	IBG	Ingham Botanical	Vl?sp	0.350	0.047	13.4	0	0	0	0.0	1
QLD88z362	14-Jun-88	MC	Martins Creek	Vlsp	0.700	0.060	8.6	0	0	0	0.0	2
QLD88z363	15-Jun-88	FWCk	Freshwater Creek	Vl?sp	0.700	0.059	8.4	0	0	0	0.0	2
QLD88z364	12-Jul-88	RRD	Ross River Dam	Vl?sp	1.050	0.102	9.7	0	0	0	0.0	3
QLD88z365	18-Jul-88	FWCk	Freshwater Creek	Vl?sp	1.400	0.096	6.9	0	0	0	0.0	4
QLD88z366	30-Aug-88	FWCk	Freshwater Creek	Vl?sp	0.807	0.059	7.3	0	0	0	0.0	2
QLD88z367	17-Sep-88	FWCk	Freshwater Creek	Vl?sp			ERROR	0		0	ERROR	
QLD88z368	17-Sep-88	FWCk	Freshwater Creek	Vl?sp			ERROR	0		0	ERROR	
QLD88z369	28-Sep-88	FWCk	Freshwater Creek	Vl?sp	1.050	0.082	7.8	0	0	0	0.0	3
QLD88z370	5-Dec-88	RRD	Ross River Dam	Vl?sp	0.350	0.034	9.7	0	0	0	0.0	1
QLD88z371	8-Dec-88	FWCk	Freshwater Creek	Vl?sp	1.221	0.103	8.4	0	0	0	0.0	3
QLD88z401	11-Apr-88	RRB	Ross River Bridg	Pttr	0.700	0.069	9.9	0	0	0	0.0	2
QLD88z402	6-Jun-88	RRB	Ross River Bridg	Pttr	0.700	0.043	6.1	0	0	0	0.0	[illegible]
QLD88z403	12-Jul-88	RRD	Ross River Dam	Pttr	0.700	0.068	9.7	0	0	0	0.0	2
QLD88z404	18-Jul-88	KC	Keelbottom Creek	Ptjv	0.700	0.048	6.9	0	0	0	0.0	2
QLD88z405	12-Sep-88	RR	Ross River	Pttr	0.350	0.036	10.3	0	0	0	0.0	1
QLD88z406	19-Sep-88	RRD	Ross River Dam	Pttr	0.700	0.062	8.9	0	0	0	0.0	2
QLD88z407	5-Dec-88	RRD	Ross River Dam	Pttr	0.350	0.026	7.4	0	0	0	0.0	1
QLD88z501	22-Mar-88	HC	Harvey Creek	Mytr	0.350	0.020	5.7	0	0	0	0.0	1
QLD88z502	22-Mar-88	HC	Harvey Creek	Mytr	0.350		0.0	0	0	0	0.0	1
QLD88z503	30-Aug-88	HC	Harvey Creek	Mytr	1.055	0.065	6.2	0	0	0	0.0	3
QLD88z504	26-Sep-88	HC	Harvey Creek	Mytr	1.050	0.066	6.3	0	0	0	0.0	3
QLD88z551	24-Feb-88	RRD	Ross River Dam	Cer	0.320	0.022	6.9	1	2	3	9.4	1
QLD88z552	28-Mar-88	AR	Alice River	Cer	0.350	0.017	4.9	0	0	0	0.0	1
QLD88z553	11-Apr-88	RRB	Ross River Bridg	Cer	0.700	0.034	4.9	0	0	0	0.0	2
QLD88z554	26-Apr-88	LC	Louisa Creek	Cer	0.350	0.022	6.3	0	0	0	0.0	1
QLD88z555	6-Jun-88	RRB	Ross River Bridg	Cer	0.700	0.060	8.6	0	0	0	0.0	2
QLD88z556	8-Jun-88	CC	Cattle Creek	Cer	0.700	0.036	5.1	0	0	0	0.0	2
QLD88z557	12-Jul-88	RRD	Ross River Dam	Cer	0.155	0.014	9.0	0	0	0	0.0	1
QLD88z558	12-Sep-88	RRD	Ross River Dam	Cer	0.270	0.030	11.1	0	0	0	0.0	1
QLD88z559	19-Sep-88	RRD	Ross River Dam	Cer	0.700	0.042	6.0	0	0	0	0.0	2
QLD88z560	5-Dec-88	RRD	Ross River Dam	Cer	0.350	0.018	5.1	0	0	0	0.0	1
QLD88z601	24-Feb-88	RRD	Ross River Dam	Naj	0.350	0.029	8.3	0	199	199	568.6	1
QLD88z602	22-Mar-88	HMB	Half Moon Bay Go	Naj	0.350	0.016	4.6	0	0	0	0.0	1
QLD88z603	11-Apr-88	RRB	Ross River Bridg	Naj	0.700	0.049	7.0	0	0	0	0.0	2
QLD88z604	5-May-88	DR	Daintree River	Naj	0.350	0.025	7.1	0	0	0	0.0	1
QLD88z605	6-Jun-88	RRB	Ross River Bridg	Naj	0.350	0.028	8.0	0	0	0	0.0	1
QLD88z606	14-Jun-88	MC	Martins Creek	Naj	0.350	0.024	6.9	0	0	0	0.0	1
QLD88z607	12-Jul-88	RRD	Ross River Dam	Naj	0.700	0.052	7.4	0	0	0	0.0	2
QLD88z608	12-Sep-88	RR	Ross River	Naj	1.050	0.120	11.4	0	0	0	0.0	3

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW	smples
QLD88z609	19-Sep-88	RRD	Ross River Dam	Naj	0.700	0.048	6.9	0	0	0	0.0	2
QLD88z651	28-Mar-88	AR	Alice River	Cha	0.700	0.054	7.7	0	0	0	0.0	2
QLD88z700	14-Mar-88	BR#2	Bohle River#2	Nygi	0.350	0.029	8.3	0	0	0	0.0	1
QLD88z701	18-Apr-88	RRB	Ross River Bridg	Ndin	0.350	0.035	10.0	0	0	0	0.0	1
QLD88z702	18-Apr-88	BP#2	Borrow Pit #2	Nygi	0.350	0.037	10.6	0	0	0	0.0	1
QLD88z703	26-Apr-88	LC	Louisa Creek	Nygi	0.335	0.033	9.9	0	0	0	0.0	1
QLD88z704	3-May-88	BR#2	Bohle River#2	Nygi	0.350	0.035	10.0	0	0	0	0.0	1
QLD88z705	6-Jun-88	RRB	Ross River Bridg	Ndin	0.350	0.035	10.0	0	0	0	0.0	1
QLD88z706	27-Jun-88	BP#2	Borrow Pit #2	Nygi	0.700	0.080	11.4	0	0	0	0.0	2
QLD88z801	28-Mar-88	AR	Alice River	Mar	0.700	0.047	6.7	0	0	0	0.0	2
QLD88z802	17-May-88	AR	Alice River	Mar	0.350	0.029	8.3	0	0	0	0.0	1
QLD89z151	13-Jun-89	DBC	Double Barrel Cr	Bloc	1.050	0.102	9.7	0	0	0	0.0	3
QLD89z152	10-Jul-89	HC	Harvey Creek	Bloc	1.050	0.128	12.2	0	0	0	0.0	3
QLD89z153	7-Aug-89	FWCk	Freshwater Creek	Bloc	0.700	0.064	9.1	0	0	0	0.0	2
QLD89z154	7-Aug-89	HC	Harvey Creek	Bloc	0.700	0.082	11.7	0	0	0	0.0	2
QLD89z201	16-Jan-89	RRD	Ross River Dam	Hyd	1.050	0.082	7.8	2	0	2	1.9	3
QLD89z202	26-Jan-89	RRD	Ross River Dam	Hyd	0.700	0.054	7.7	0	0	0	0.0	2
QLD89z203	28-Feb-89	BP#2	Borrow Pit #2	Hyd	1.050	0.063	6.0	0	0	0	0.0	3
QLD89z204	14-Mar-89	AR	Alice River	Hyd	1.050	0.072	6.9	0	0	0	0.0	3
QLD89z205	27-Mar-89	AR	Alice River	Hyd	1.050	0.084	8.0	0	0	0	0.0	3
QLD89z206	18-Apr-89	AR	Alice River	Hyd	1.050	0.086	8.2	0	0	0	0.0	3
QLD89z207	5-May-89	RRD	Ross River Dam	Hyd	0.350	0.014	4.0	1	0	1	2.9	1
QLD89z208	16-May-89	AR	Alice River	Hyd	1.050	0.084	8.0	0	0	0	0.0	3
QLD89z209	7-Jun-89	AR	Alice River	Hyd	2.100	0.584	27.8	0	0	0	0.0	6
QLD89z211	3-Jul-89	AR	Alice River	Hyd	1.400	0.160	11.4	0	0	0	0.0	4
QLD89z212	10-Jul-89	FWCk	Freshwater Creek	Hyd	0.250	0.018	7.2	0	0	0	0.0	1
QLD89z213	24-Jul-89	AR	Alice River	Hyd	2.800	0.236	8.4	0	0	0	0.0	8
QLD89z214	1-Aug-89	AR	Alice River	Hyd	1.050	0.072	6.9	0	0	0	0.0	3
QLD89z215	15-Aug-89	AR	Alice River	Hyd	1.050	0.106	10.1	0	0	0	0.0	3
QLD89z351	5-Jan-89	RRD	Ross River Dam	Vl?sp	0.700	0.044	6.3	1	38	39	55.7	2
QLD89z352	16-Jan-89	RRD	Ross River Dam	Vl?sp	0.700	0.042	6.0	1	0	1	1.4	2
QLD89z353	26-Jan-89	RRD	Ross River Dam	Vl?sp	0.700	0.046	6.6	0	0	0	0.0	2
QLD89z354	13-Mar-89	IBG	Ingham Botanical	Vl?sp	0.700	0.072	10.3	0	0	0	0.0	2
QLD89z355	12-Jun-89	FWCk	Freshwater Creek	Vl?sp	1.400	0.144	10.3	0	0	0	0.0	4
QLD89z356	10-Jul-89	FWCk	Freshwater Creek	Vl?sp	0.600	0.048	8.0	0	0	0	0.0	2
QLD89z357	7-Aug-89	FWCk	Freshwater Creek	Vl?sp	1.400	0.106	7.6	0	0	0	0.0	4
QLD89z359		FWCk	Freshwater Creek	Vl?sp	3.057	0.295	9.6	0	0	0	0.0	8
QLD89z401	10-Jul-89	HC	Harvey Creek	Ptjv	0.700	0.074	10.6	0	0	0	0.0	2
QLD89z402	7-Aug-89	HC	Harvey Creek	Ptjv	0.700	0.092	13.1	0	0	0	0.0	2
QLD89z501	10-Jul-89	HC	Harvey Creek	Mytr	1.050	0.066	6.3	0	0	0	0.0	3
QLD89z502	7-Aug-89	HC	Harvey Creek	Mytr	0.700	0.072	10.3	0	0	0	0.0	2
QLD89z551	5-Jan-89	RRD	Ross River Dam	Cer	1.050	0.078	7.4	2	4	6	5.7	3
QLD89z552	16-Jan-89	RRD	Ross River Dam	Cer	0.350	0.018	5.1	0	0	0	0.0	1
QLD89z553	26-Jan-89	RRD	Ross River Dam	Cer	0.700	0.036	5.1	0	0	0	0.0	2
QLD89z554	7-Mar-89	RRD	Ross River Dam	Cer	0.350	0.014	4.0	0	0	0	0.0	1
QLD89z555	5-May-89	RRD	Ross River Dam	Cer	0.700	0.032	4.6	2	0	2	2.9	2
QLD89z651	7-Mar-89	RRD	Ross River Dam	Utr	0.350	0.012	3.4	0	0	0	0.0	1
QLD89z701	26-Jan-89	RRD	Ross River Dam	Eic	0.700	0.052	7.4	0	0	0	0.0	2
QLD90z201	9-Feb-90	KB	Keelbottom Billa	Hyd	2.310	0.250	10.8	0	0	0	0.0	7
QLD90z202	9-Feb-90	AR	Alice River	Hyd	1.400	0.118	8.4	0	0	0	0.0	4
QLD90z203	12-Feb-90	UDR	Upper Daintree R	Hyd	0.700	0.048	6.9	0	0	0	0.0	2
QLD90z204	12-Feb-90	DR	Daintree River	Hyd	0.700	0.064	9.1	0	0	0	0.0	2
QLD90z205	6-Mar-90	RRD	Ross River Dam	Hyd	1.050	0.118	11.2	0	0	0	0.0	3
QLD90z206	19-Mar-90	AR	Alice River	Hyd	1.050	0.092	8.8	0	0	0	0.0	3
QLD90z207	27-Mar-90	RRD	Ross River Dam	Hyd	0.700	0.048	6.9	1	0	1	1.4	2
QLD90z208	2-May-90	RRD	Ross River Dam	Hyd	1.050	0.074	7.0	0	1	1	1.0	3
QLD90z209	25-Jul-90	BR#2	Bohle River#2	Hyd	0.700	0.058	8.3	0	0	0	0.0	2
QLD90z210	5-Aug-90	LC	Louisa Creek	Hyd	1.400	0.168	12.0	0	0	0	0.0	4
QLD90z211	9-Aug-90	BR#2	Bohle River#2	Hyd	1.750	0.102	5.8	0	0	0	0.0	5
QLD90z212	13-Aug-90	AP	Apex Park	Hyd	1.050	0.074	7.0	0	0	0	0.0	3

QLD90z213	5-Sep-90	RR	Ross River	Hyd	1.010	0.078	7.7	0	0	0	0.0	3
QLD90z214	12-Sep-90	BR#2	Bohle River#2	Hyd	1.750	0.138	7.9	0	0	0	0.0	5
QLD90z215	26-Sep-90	AR	Alice River	Hyd	1.750	0.130	7.4	0	0	0	0.0	5
QLD90z216	26-Oct-90	AR	Alice River	Hyd	1.050	0.080	7.6	0	0	0	0.0	3
QLD90z217	30-Oct-90	RR	Ross River	Hyd	1.050	0.078	7.4	0	0	0	0.0	3
QLD90z218	8-Nov-90	RRD	Ross River Dam	Hyd	1.750	0.144	8.2	0	0	0	0.0	5
QLD90z219	8-Nov-90	AR	Alice River	Hyd	1.750	0.135	7.7	0	0	0	0.0	5
QLD90z400	26-Sep-90	RRD	Ross River Dam	Pttr	1.400	0.092	6.6	0	0	0	0.0	4
QLD90z550	2-Apr-90	RRB	Ross River Bridg	Cer	1.050	0.042	4.0	0	0	0	0.0	3
QLD90z551	9-Apr-90	RRB	Ross River Bridg	Cer	1.050	0.044	4.2	0	0	0	0.0	3
QLD90z552	2-May-90	RRD	Ross River Dam	Cer	0.350	0.012	3.4	0	0	0	0.0	1
QLD90z553	5-Aug-90	LC	Louisa Creek	Cer	1.050	0.096	9.1	0	0	0	0.0	3
QLD90z600	13-Aug-90	AP	Apex Park	Naj	0.230	0.012	5.2	0	0	0	0.0	1
QLD90z700	2-Apr-90	RRB	Ross River Bridg	Ndin	1.280	0.111	8.7	0	0	0	0.0	4
QLD90z701	9-Apr-90	RRB	Ross River Bridg	Ndin	1.050	0.090	8.6	0	0	0	0.0	3
QLD90z702	2-May-90	RRD	Ross River Dam	Ndin	0.700	0.048	6.9	0	0	0	0.0	2
QLD90z703	25-Jul-90	BR#2	Bohle River#2	Nygi	0.350	0.042	12.0	0	0	0	0.0	1
QLD90z704	25-Jul-90	PP	Palmetum Pond	Nygi	0.350	0.062	17.7	0	0	0	0.0	1
QLD90z705	25-Jul-90	RRB	Ross River Bridg	Ndin	0.350	0.052	14.9	0	0	0	0.0	1
QLD90z706	9-Aug-90	BR#2	Bohle River#2	Nygi	0.350	0.038	10.9	0	0	0	0.0	1
QLD90z707	17-Aug-90	RRD	Ross River Dam	Ndin	1.050	0.164	15.6	0	0	0	0.0	3
QLD90z708	5-Sep-90	RRD	Ross River Dam	Ndin	0.700	0.080	11.4	0	0	0	0.0	2
QLD90z709	5-Sep-90	RR	Ross River	Nygi	0.870	0.104	12.0	0	0	0	0.0	3
QLD90z710	5-Sep-90	RR	Ross River	Ndin	1.300	0.168	12.9	0	0	0	0.0	4
QLD90z711	12-Sep-90	RR	Ross River	Nygi	0.350	0.040	11.4	0	0	0	0.0	1
QLD90z712	12-Sep-90	RR	Ross River	Ndin	1.400	0.172	12.3	0	0	0	0.0	4
QLD90z713	26-Sep-90	RRD	Ross River Dam	Ndin	1.250	0.086	6.9	0	0	0	0.0	3
QLD91z201	6-Jun-91	KB	Keelbottom Billa	Hyd	0.180	0.012	6.7	0	0	0	0.0	1
QLD91z202	6-Jun-91	RRD	Ross River Dam	Hyd	1.050	0.086	8.2	0	0	0	0.0	3
QLD91z203	6-Jun-91	BR#2	Bohle River#2	Hyd	1.400	0.082	5.9	0	0	0	0.0	4
QLD91z204	21-Oct-91	MC	Martins Creek	Hyd	1.585	0.157	9.9	0	0	0	0.0	5
QLD92z201	6-Feb-92	BR#2	Bohle River#2	Hyd	1.050	0.128	12.2	0	2	2	1.9	3
QLD92z202	6-Feb-92	RRB	Ross River Bridg	Hyd	0.700	0.044	6.3	0	0	0	0.0	2
QLD92z203	6-Feb-92	RRD	Ross River Dam	Hyd	1.050	0.086	8.2	0	0	0	0.0	3
QLD92z204	13-Feb-92	AR	Alice River	Hyd	1.400	0.192	13.7	0	0	0	0.0	4

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		23	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		2	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Pistia stratiotes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nelumbo nucifera?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		1	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		4	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		1	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		21	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		2	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Azolla pinnata?	8	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Azolla pinnata?	4	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	10	0	0	0	0	4	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	1	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	2	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	9	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	6	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	9	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	5	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	1	1	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	13	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	5	0	2	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	23	22	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	19	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	11	6	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	3	15	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	5	4	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	1	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	9	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	5	5	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	139	9	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	8	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	6	0	1	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	18	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	34	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	[illegible]	0	0	0	0	0	0	0	0

sub	brl	Myriophyllum verrucosum	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	19	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	10	3	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	2	0	60	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	39	1	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	4	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	14	3	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	0	1	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	4	3	3	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	1	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nitella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	12	0	1	0
shr	brl	Nymphoides indica	0	0	0	0	2	0	0	0	0	1	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	3	0	0	0	0	19	0	0	0	2	0	0	0
shr	brl	Nymphoides indica	0	0	0	0	0	7	0	0	0	2	1	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
shr	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	7	0	0	0
sub	brl	Nymphoides indica	1	0	0	0	0	0	0	0	0	2	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	2	0	0	0
sub	brl	Nymphoides indica	9	0	0	0	0	35	0	0	0	6	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	2	0	0	0	0	6	2	0	0
sub	brl	Nymphoides indica	1	0	0	0	0	22	1	0	0	12	3	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	1	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	1	15	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	5	2	0	0
sub	brl	Nymphoides indica	1	0	0	0	4	0	0	0	0	8	4	0	0
sub	brl	Nymphoides indica	0	0	0	0	1	4	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	3	0	0	0	0	29	0	2	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	35	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	27	0	0	0	4	0	1	0
sub	brl	Marsilea drummondii?	23	0	0	0	0	0	0	0	0	0	0	0	2
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	3	0	0	0
sub	brl	Marsilea drummondii?	60	0	0	0	0	0	0	0	0	0	0	0	1
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	3	0
sub	brl	Ipomoea aquatica	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	1	0	0	0	0	0	0	0	0	0	0	1	0
sub	brl	Marsilea drummondii?	60	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	21	0	0	0	0	0	0	0	0	0	0	3	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	6	0
sub	brl	Marsilea drummondii?	67	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	3	0	0	0	1	0	0	0	0	0	0	8	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	8	0	0	0	0	0	0	0	0	0	0	5	0
sub	brl	Marsilea drummondii?	25	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	2	0	0	0	0	0	0	65	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Marsilea drummondii?	13	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	1	0	0	0	0	0	0	0	0	0	0	53	1
sub	brl	Polygonum decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Polygonum decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	4	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	44	0	0	0
sub	brl	Pistia stratiotes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	1	0	0	0
sub	brl	Pistia stratiotes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Pistia stratiotes	0	0	0	0	9	0	0	0	0	0	0	0	0
sub	brl	Lemna sp.	0	0	0	0	0	0	0	0	0	5	0	0	0

sub	brl	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Pistia stratiotes	40	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Salvinia molesta	6	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Salvinia molesta	6	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Pistia stratiotes	7	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Lemna sp.	0	0	0	0	0	0	0	0	0	0	2	0	0
sub	brl	Eichhornia crassipes	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	12	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	1	1	0	0	0	0	0	0	0	0	0
sub	brl	Ottelia alismoides	0	0	0	0	23	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	3	4	6	0	0	0	0	0	0	0	0	0
sub	brl	Otellia ovalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	1	0	0	0	0	0	0	0	0	0
sub	brl	Otellia ovalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa aubertii	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa aubertii	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ottelia alismoides	0	0	0	0	2	1	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	4	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	2	0	2	0	0	0	0	0	0	0	0	0
sub	brl	Ottelia alismoides	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	1	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	10	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ottelia alismoides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	28	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	9	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	2	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	101	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ottelia alismoides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Otellia ovalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	1	3	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Otellia ovalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	11	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	27	4	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	2	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	13	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	1	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	33	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	76	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	14	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	5	10	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	9	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	55	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	11	38	2	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	11	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	4	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	1	2	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	3	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	8	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	3	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	3	7	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	1	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	2	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	0	3	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	3	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	3	12	4	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	2	1	1	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	1	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	8	2	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	2	6	0	0	1	0	1	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	24	0	0	0	0	4	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	0	1	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	3	0	0	0	0	1	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	[illegible]	0	0	0	0	0	0	0	0
sub	brl	Cabomba caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Cabomba caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Cabomba caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Cabomba caroliniana	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Cabomba caroliniana	0	0	0	1	2	0	9	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	5	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	18	0	0	7	4	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	0	0	0	1	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	8	0	40	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	2	0	16	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	3	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	5	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	2	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	0	0	0	0

sub	brl	Ceratophyllum demersum	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	6	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	2	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nitella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	4	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	2	0	0	0	0	0	0	0	0	0	1	0	0
sub	brl	Utricularia sp.	22	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	8	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	6	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	8	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	21	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Cyperus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	11	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nitella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	20	0	0	0	0	1	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	3	4	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Nymphoides indica	2	0	0	0	6	14	0	0	0	2	0	0	0
sub	brl	Nymphoides indica	1	0	0	0	53	15	0	0	0	0	1	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	7	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	3	23	0	0	0	1	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	2	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	6	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	22	27	0	0	9	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	6	1	0	0	1	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	11	26	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	7	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	2	0	0	0	0	0	0
sub	brl	Nymphoides indica	2	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	5	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	6	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Polygonum decipiens?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Typha sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	1	1	0	0	0	25	3	24	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	11	1	37	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	2	0	60	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	2	0	0	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	2	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	17	0
sub	brl	Monochoria cyanea	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ludwigia hysoppifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	1	0	0	0	0	1	0	0	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ludwigia hysoppifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eleocharis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	2	0	0	0	0	0	0	[illegible]	0
sub	brl	Marsilea drummondii?	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ceratopteris sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0	0	1	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Villarsia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	2	0	0	0
sub	brl	Eleocharis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	4	0	0	0	0	0	0	0	0	5	0	1	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eleocharis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	1	0
sub	brl	Leersia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Philydrum lanuginosum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	1	0	0	0	0	0	0	0	0	0	0	0	0

sub	brl	Pistia stratiotes	3	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Salvinia molesta	49	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Eichhornia crassipes	8	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Azolla pinnata?	0	0	0	0	11	0	0	0	0	0	0	0	0
sub	brl	Eichhornia crassipes	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Otellia ovalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	1	4	0	1	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	4	1	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	5	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	2	11	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	5	1	0	3	0	0	0	0	0	0
sub	brl	Blyxa octandra	1	0	0	1	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	14	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	51	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	2	0	0	1	0	7	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	1	0	85	1	0	28	0	0	1	0	0	0
sub	brl	Blyxa octandra	0	8	0	8	0	0	1	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	2	1	75	0	0	8	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	3	0	8	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	17	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	19	2	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	6	0	2	0	26	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	2	0	70	0	1	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	1	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	6	37	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	1	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	18	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	17	42	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	1	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	1	0	0	0	2	0	0	0
sub	brl	Hydrilla verticillata	0	2	21	1	0	0	0	0	0	1	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	23	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	6	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	6	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	13	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	40	57	5	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	13	37	1	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	18	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	16	2	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	25	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	3	4	29	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	1	26	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	52	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	19	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	5	5	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	2	4	11	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	3	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	3	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	7	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	6	0	52	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	49	0	0	0	0	0	0
shr	brl	Potamogeton crispus	0	0	0	0	0	0	1	0	0	0	0	0	

sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	9	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	5	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	2	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	1	1	0	0	5	0	1	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	1	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	4	0	5	2	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	2	2	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Ceratophyllum demersum	0	0	0	0	3	0	68	15	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	15	0	0	0	0	0	0
shr	brl	Ceratophyllum demersum	0	0	0	0	0	0	40	0	3	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	30	0	6	0	0	0	0
shr	brl	Ceratophyllum demersum	0	0	0	0	0	0	26	0	4	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	4	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	5	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	5	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	2	0	0	0	0	0
shr	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	3	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	10	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	3	0	0	0	0	0	0	0	0	2	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	5	0	0	0	2	0	1	0	0	4	0	0	0
sub	brl	Aponogeton sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	45	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	1	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	1	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	6	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	1	1	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Nymphoides indica	4	0	0	0	0	17	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	35	8	0	0	0	0	0	0
shr	brl	Nymphoides indica	12	0	0	0	0	6	4	0	0	14	0	0	0
shr	brl	Nymphoides indica	2	0	0	0	0	4	0	0	0	1	0	0	0
sub	brl	Nymphoides indica	4	0	0	0	0	13	1	0	0	3	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	4	0	0	0	0	0	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	21	0	0	0	2	2	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Monochoria cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Eleocharis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Scirpus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ipomoea aquatica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
sub	lght		0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Azolla pinnata?	27	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	2	7	0	10	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	1	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	2	5	2	9	27	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	1	0	1	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	2	0	0	0	0
sub	brl	Blyxa octandra	0	3	7	13	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	1	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	1	6	29	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	3	2	0	0	0	1	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	3	2	8	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	2	18	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	1	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	1	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	5	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	1	0	0	0	0	0	0	0	0	1	0
sub	brl	Hydrilla verticillata	0	3	0	1	0	1	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	1	19	3	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	1	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	26	66	4	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	8	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	6	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	1	0	0	0	0	0	1	0	0	0	0
sub	brl	Hydrilla verticillata	0	17	130	8	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	13	0	0	0	0	2	0	5	0
sub	brl	Hydrilla verticillata	0	39	282	14	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	80	166	17	0	0	0	0	3	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	3	0	0	0	7	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	3	6	0	12	24	0	0	0	0	0	0	0

sub	brl	Hydrilla verticillata	0	43	94	5	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	4	0	0	0	16	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	1	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	9	29	46	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	1	16	4	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	0	0	0	3	0	0	0	0
sub	brl	Hydrilla verticillata	0	6	9	10	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	2	2	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	9	4	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	4	2	1	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	1	6	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	62	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	2	10	10	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	2	1	18	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	6	32	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	2	4	40	0	0	0	0	0	0	0	0	0
shr	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Vallisneria ?spiralis	0	0	0	0	11	0	0	0	6	0	0	0	0
sub	brl	Vallisneria spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	17	0	7	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	76	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	5	59	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	19	5	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	5	18	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	1	5	12	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	12	2	3	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	4	7	1	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	73	0	0	0	17	12	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	16	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	2	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	23	0	0	0	5	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	1	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	1	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	5	0	0	5	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	1	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	4	0	0	0	31	1	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	3	0	0	0	0	2	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	5	0	0	0	9	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	2	3	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	1	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	1	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0

where	how	Host sp.	wvls	Aulac	N.erom	Strep	P.dicn	P#3	P#8	P#4	Pothe	N1	N2	N3	N4
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Chara sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	2	0
sub	brl	Nymphoides indica	0	0	0	0	8	0	0	0	6	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	64	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	1	0	0	0	0	29	6	0	0
shr	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	5	6	0	0
sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	4	0	0	0	0
sub	brl	Nymphaea gigantea	0	0	0	0	3	0	0	0	6	149	0	0	0
sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	13	261	0	0
sub	brl	Marsilea drummondii?	12	0	0	0	1	0	0	0	0	25	0	57	0
sub	brl	Blyxa octandra	0	0	0	2	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	14	2	1	0	0	0	0	0	0	0	0	0
sub	brl	Blyxa octandra	0	0	0	2	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	10	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	9	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	5	0	0	0	0
shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	16	0	0	0	0
flt	brl	Vallisneria ?spiralis	0	0	0	0	1	0	0	0	0	0	0	0	0
flt	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
shr	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	6	1	0	0	0	0	0	0	0	0	0	0
sub	brl	Vallisneria ?spiralis	0	4	10	36	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton javanicus	0	0	0	1	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Myriophyllum trachycarpu	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	1	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Utricularia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	1	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	1	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
flt	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	8	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0
sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	NTR85L01	
0	0	0	0	1	1	0	0	NTR85L02	
0	0	0	0	0	0	0	0	NTR85L03	
0	0	0	0	0	0	0	0	NTR85L04	
0	0	0	0	0	0	0	0	NTR85L05	
0	0	0	0	0	0	0	0	NTR85L06	
0	0	0	0	0	0	0	0	NTR85L09	
0	0	0	0	0	0	0	0	NTR85L10	
0	0	0	0	0	0	0	0	NTR85z101	
0	0	0	20	0	20	0	0	NTR85z201	
0	0	0	0	0	0	0	0	NTR85z202	
0	0	0	0	0	0	0	0	NTR85z203	
0	0	0	0	0	0	0	0	NTR85z204	
0	0	0	0	0	0	0	0	NTR85z205	can't find this data
0	0	0	0	0	0	0	0	NTR85z206	can't find this data
0	0	0	0	0	0	0	0	NTR85z207	can't find this data
0	0	0	17	19	36	0	0	NTR85z208	
0	0	0	0	0	0	0	5	NTR85z551	5 Paraponyx
0	0	0	0	0	0	0	0	NTR85z651	can't find this data
0	0	0	0	0	0	0	0	NTR85z701	can't find this data
0	0	0	0	0	0	0	8	NTR85z702	5 Nymphula, 3 Parapoynx
0	0	0	0	0	0	0	83	NTR85z703	up to 83 Nymphula
0	0	0	0	0	0	0	0	NTR86z201	can't find this data
0	0	0	0	0	0	0	0	NTR86z202	can't find this data
0	0	0	0	0	0	0	0	NTR86z203	can't find this data
0	0	0	0	0	0	0	0	NTR86z351	can't find this data
0	0	0	0	0	0	0	0	NTR86z352	can't find this data
0	0	0	0	0	0	0	0	NTR86z501	can't find this data
0	0	0	0	0	0	0	0	NTR86z551	can't find this data
0	0	0	0	0	0	0	0	NTR86z601	can't find this data
0	0	0	0	0	0	0	0	NTR86z701	can't find this data
0	0	0	0	0	0	0	0	NTR86z702	can't find this data
0	0	0	0	0	0	0	0	NTR86z801	can't find this data
0	0	0	0	0	0	0	0	QLD85L01	
0	0	0	0	0	0	0	0	QLD85L02	
0	0	0	0	0	0	0	0	QLD85L03	
0	0	0	0	0	0	0	0	QLD85L04	
0	0	0	0	0	0	0	0	QLD85L05	
0	0	0	0	0	0	0	0	QLD85L06	
0	0	0	0	0	0	0	0	QLD85L07	
0	0	0	0	0	0	0	0	QLD85L08	
0	0	0	0	0	0	0	0	QLD85L09	
0	0	0	0	0	0	0	0	QLD85L10	
0	0	0	0	0	0	0	0	QLD85L11	
0	0	0	0	0	0	0	0	QLD85m201	
0	0	0	0	0	0	0	0	QLD85m202	
0	0	0	0	0	0	0	0	QLD85m203	
0	0	0	0	0	0	0	0	QLD85m204	
0	0	0	0	0	0	0	0	QLD85m206	
0	0	0	0	0	0	0	0	QLD85m209	
0	0	0	0	0	0	0	0	QLD85m210	
0	0	0	0	0	0	0	0	QLD85m211	
0	0	0	0	0	0	0	0	QLD85m212	
0	0	0	0	0	0	0	0	QLD85m213	
0	0	0	0	0	0	0	0	QLD85m214	
0	0	0	0	0	0	0	0	QLD85m215	
0	0	0	0	0	0	0	0	QLD85m216	
0	0	0	0	0	0	0	0	QLD85m217	
0	0	0	0	0	0	0	0	QLD85m218	

0	0	0	0	0	0	0	0	QLD85m220	
0	0	0	0	0	0	0	0	QLD85m222	
0	0	0	0	0	0	0	0	QLD85m223	
0	0	0	0	0	0	0	0	QLD85m224	
0	0	0	0	0	0	0	0	QLD85m229	
0	0	0	0	0	0	0	0	QLD85z297	
0	0	0	0	0	0	0	0	QLD85z298	
0	0	0	0	0	0	0	0	QLD85z299	
0	0	0	0	0	0	0	0	QLD85m407	
0	4	0	0	0	0	0	12	QLD85z101	12 Nymph.,3 samples in book
0	29	0	0	0	0	0	27	QLD85z102	27 adult moths
0	4	0	0	0	0	0	0	QLD85z103	
0	24	0	0	0	0	0	0	QLD85z104	
0	0	0	0	0	0	0	0	QLD85z201	
0	0	0	0	0	0	0	0	QLD85z202	
0	0	0	0	0	0	0	0	QLD85z204	
0	0	0	0	0	0	0	3	QLD85z205	4 Pyralidae
0	0	0	0	1	1	0	0	QLD85z206	
0	0	0	0	0	0	0	0	QLD85z207	
0	0	0	0	0	0	0	0	QLD85z208	can't find 208 data
0	0	0	3	1	4	0	0	QLD85z209	
0	0	0	8	11	19	0	0	QLD85z210	+ Paraponyx
0	0	0	0	0	0	0	0	QLD85z211	
0	0	0	2	7	9	0	12	QLD85z212	12 Paraponyx
0	0	0	7	7	14	0	0	QLD85z213	
0	0	0	34	4	38	0	0	QLD85z214	
0	0	0	40	0	40	0	1	QLD85z215	
0	0	0	0	0	0	0	0	QLD85z216	
0	0	0	26	0	26	0	2	QLD85z217	
0	0	0	36	19	55	0	2	QLD85z218	5 Paraponyx
0	0	0	1	0	1	0	0	QLD85z219	
0	0	0	85	19	104	0	0	QLD85z220	+Parap. & Nymph.
0	0	0	0	0	0	0	0	QLD85z221	
0	0	0	0	0	0	0	0	QLD85z222	
0	0	0	23	4	27	0	0	QLD85z223	
0	0	0	0	0	0	0	7	QLD85z224	13 Parapoynx
0	0	0	3	0	3	0	9	QLD85z230	12 Parapoynx
0	0	0	176	28	204	0	0	QLD85z235	can't find this data
0	0	0	1	0	1	0	4	QLD85z236	5 Parapoynx
0	0	0	186	78	264	0	0	QLD85z237	
0	0	0	4	2	6	0	4	QLD85z238	5 Parap.sp.
0	0	0	46	14	60	0	40	QLD85z239	49 Parap.sp.
0	0	0	325	91	416	0	5	QLD85z240	7 Parap.sp.
0	0	0	6	1	7	0	3	QLD85z241	3 Parap.sp.
0	0	0	260	57	317	0	3	QLD85z242	3 Parap.sp.
0	0	0	13	9	22	0	2	QLD85z243	7 Parap.sp.
0	0	0	358	91	449	0	1	QLD85z244	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z245	
0	0	0	38	5	43	0	4	QLD85z246	9 Parap.sp.
0	0	0	11	0	11	0	0	QLD85z247	
0	0	0	289	71	360	0	3	QLD85z248	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z249	
0	0	0	438	30	468	0	4	QLD85z250	6 Parap.sp.
0	0	0	810	127	937	0	3	QLD85z251	3 Parap.sp.
0	0	0	302	69	371	0	3	QLD85z252	4 Parap.sp.
0	0	0	698	54	752	0	1	QLD85z253	2 Parap.sp.
0	0	0	4	3	7	4	6	QLD85z254	19 Parap.sp.
0	0	0	61	9	70	0	3	QLD85z255	3 Parap.sp.
0	0	0	190	69	259	0	13	QLD85z256	20 Parap.sp.
0	0	0	2	1	3	0	1	QLD85z257	1 Parap.sp.

ɔph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	7	0	7	0	1	QLD85z259	1 Parap.sp.
0	0	0	175	53	228	0	1	QLD85z260	3 Parap.sp.
0	0	0	38	5	43	4	19	QLD85z261	26 Parap.sp.
0	0	0	2	0	2	0	76	QLD85z262	76 Argy.
0	0	0	185	13	198	0	3	QLD85z263	5 Parap.sp.
0	0	0	37	20	57	0	9	QLD85z264	28 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z265	1 Parap.sp.
0	0	0	39	50	89	2	0	QLD85z266	
0	0	0	108	10	118	0	0	QLD85z267	
0	0	0	185	42	227	0	0	QLD85z268	
0	0	0	59	24	83	0	0	QLD85z269	
0	0	0	0	1	1	0	26	QLD85z270	26 Argyr.
0	0	0	71	71	142	0	5	QLD85z271	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z272	
0	0	0	0	1	1	0	0	QLD85z273	
0	0	0	101	11	112	0	0	QLD85z274	
0	0	0	103	6	109	0	0	QLD85z275	
0	0	0	27	28	55	1	0	QLD85z276	
0	0	0	69	15	84	0	0	QLD85z277	
0	0	0	4	1	5	0	39	QLD85z278	57 Argy.
0	0	0	76	30	106	0	8	QLD85z279	8 Parap.sp.
0	0	0	4	0	4	0	41	QLD85z280	50 Parap.sp.
0	0	0	60	12	72	0	0	QLD85z281	
0	0	0	77	4	81	0	0	QLD85z282	
0	0	0	2	0	2	0	3	QLD85z283	5 Parap.sp.
0	0	0	114	0	114	0	1	QLD85z284	1 Parap.sp.
0	0	0	0	0	0	0	73	QLD85z285	83 Parap.sp.
0	0	0	99	0	99	0	1	QLD85z286	1 Parap.sp.
0	0	0	21	15	36	0	3	QLD85z287	2(L) & 1(A) Parap.sp.
0	0	0	0	0	0	0	3	QLD85z288	13 Argy.
0	0	0	4	0	4	0	0	QLD85z289	
0	0	0	281	21	302	0	0	QLD85z290	
0	0	0	0	1	1	0	38	QLD85z291	186 Parap.sp.,5 samples in book
0	0	0	18	9	27	0	0	QLD85z292	
0	0	0	2	9	11	0	0	QLD85z293	
0	0	0	144	0	144	0	6	QLD85z294	6 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z295	
0	0	0	1	0	1	0	38	QLD85z296	36(A) & 3(L) Parap.sp.
0	0	0	13	3	16	0	3	QLD85z300	3(L) Parap.sp.
0	0	0	0	0	0	0	0	QLD85z301	
0	0	0	0	0	0	0	13	QLD85z302	16 Parap.sp.
0	0	0	0	0	0	0	2	QLD85z303	3 Parap.sp.,also has a delayed sample(303D)
0	0	0	8	10	18	0	4	QLD85z304	3 Parap.sp.
0	0	0	0	0	0	0	2	QLD85z305	can't find this data
0	0	0	1	0	1	0	1	QLD85z306	1 (A) Nymph.sp.
0	0	0	10	3	13	0	18	QLD85z307	14(L),1(A)Parap.sp.,4(A)Nymph.
0	0	0	0	0	0	0	5	QLD85z308	4(A) Nymph.sp.,1 Parap.
0	0	0	0	0	0	1	0	QLD85z309	
0	0	0	35	2	37	0	5	QLD85z310	3(L) & 3(A) Parap.sp.
0	0	0	68	6	74	0	3	QLD85z311	11(L) Parap.sp.
0	0	0	1	2	3	0	2	QLD85z312	2 Argy.
0	0	0	2	0	2	0	2	QLD85z313	9 Parap.sp.
0	0	0	0	0	0	0	25	QLD85z401	43 Parap.sp.
0	0	0	0	0	0	0	12	QLD85z402	13 Parap.sp.,has Ephyd.but not Hydrellia
0	0	0	0	0	0	0	14	QLD85z403	48 Parap.sp.
0	0	0	2	0	2	0	7	QLD85z404	7 Parap.sp.
0	0	0	2	1	3	0	1	QLD85z405	1(A) Parap.sp.

0	0	0	0	0	0	0	11	QLD85z406	12 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z408	3 Parap.sp.
0	0	0	1	0	1	0	1	QLD85z501	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z502	
0	0	0	0	0	0	0	0	QLD85z503	
0	0	0	0	0	0	0	0	QLD85z504	
0	0	0	0	0	0	0	5	QLD85z551	1 Nymph.sp.,6 Parap. sp.
0	0	0	1	0	1	0	3	QLD85z552	4 Parap.sp.
0	0	0	5	9	14	0	26	QLD85z553	46 Parap.sp.
0	0	0	3	2	5	0	0	QLD85z554	12 Parap.sp.,1 Nymph.
0	0	0	0	0	0	0	1	QLD85z555	1(A) Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z556	
0	0	0	4	4	8	0	10	QLD85z557	72 Parap.sp.
0	0	0	0	1	1	0	3	QLD85z558	6 Parap.sp.
0	0	0	14	2	16	0	26	QLD85z559	65 Parap.sp., 1 Nymph.
0	0	0	1	0	1	0	5	QLD85z560	10 Parap.sp.
0	1	0	0	0	0	0	3	QLD85z561	2 Parap.sp., 1 Nymph.
0	0	0	0	0	0	1	0	QLD85z562	
0	0	0	0	0	0	0	0	QLD85z563	
0	0	0	0	1	1	0	17	QLD85z564	21 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z565	
0	0	0	0	0	0	0	12	QLD85z566	12 Parap.sp.
0	0	0	5	0	5	0	29	QLD85z567	46 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z568	
0	0	0	0	0	0	0	0	QLD85z569	
0	0	0	1	0	1	0	0	QLD85z570	
0	0	0	0	7	7	0	0	QLD85z601	
0	0	0	15	12	27	0	0	QLD85z602	
0	0	0	3	7	10	0	1	QLD85z603	2 Parap.sp.
0	0	0	22	36	58	0	0	QLD85z604	
0	0	0	16	36	52	0	1	QLD85z605	2 Parap.sp.
0	0	0	11	11	22	0	1	QLD85z606	1 Parap.sp.
0	0	0	0	3	3	0	0	QLD85z607	
0	0	0	20	1	21	0	6	QLD85z608	7 Parap.sp., 2 Nymph.
0	0	0	0	0	0	0	9	QLD85z609	14 Parap.sp.
0	0	0	30	7	37	0	1	QLD85z610	1 Parap.sp.
0	0	0	0	0	0	0	1	QLD85z611	1 Pyral.
0	0	0	0	0	0	0	0	QLD85z612	
0	0	0	0	0	0	0	0	QLD85z613	
0	0	0	0	0	0	0	0	QLD85z614	
0	0	0	0	0	0	0	1	QLD85z615	1 Parap.sp.
0	0	0	0	0	0	0	4	QLD85z651	4 Parap.sp.
0	0	0	0	1	1	0	3	QLD85z652	5 Parap.sp.
0	0	0	0	0	0	0	2	QLD85z653	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z654	
0	0	0	0	0	0	0	9	QLD85z656	9 Argy.
0	0	0	1	0	1	0	3	QLD85z657	4 Parap.sp.
0	0	0	5	1	6	0	1	QLD85z658	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z659	10 Argy.
0	0	0	0	1	1	0	6	QLD85z660	6 Parap.sp., 1(A) Pyral.
0	0	0	7	2	9	0	1	QLD85z661	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z662	1 Argy.
0	0	0	0	0	0	0	1	QLD85z663	1 Parap.sp.
0	0	0	0	0	0	0	1	QLD85z664	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z665	
0	0	0	0	0	0	0	0	QLD85z666	
0	0	0	0	0	0	0	0	QLD85z667	
0	0	0	0	0	0	0	0	QLD85z668	

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	QLD85z707	5 Nymph.sp., 2 Parap.sp.
0	0	0	0	0	0	0	1	QLD85z708	3 Parap.sp.
0	0	0	0	0	0	0	2	QLD85z709	4 Nymph.sp.
0	0	0	0	0	0	0	13	QLD85z710	47 Parap.sp., 7 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z711	
0	0	0	0	0	0	0	7	QLD85z712	16 Nymph.sp., 1 Parap.sp.
0	0	0	0	0	0	0	19	QLD85z713	38 Parap.sp., 19 Nymph.sp.
0	0	0	8	1	9	0	0	QLD85z714	
0	0	0	0	0	0	0	1	QLD85z715	2 Nymph.sp.
0	0	0	0	1	1	0	21	QLD85z716	37 Parap.sp.
0	0	0	0	1	1	0	7	QLD85z717	12 Nymph.sp.
0	0	0	0	1	1	4	11	QLD85z718	19 Nymph.sp., 8 Parap.sp.
0	0	0	0	0	0	0	1	QLD85z719	6 Parap.sp.
0	0	0	0	0	0	0	12	QLD85z720	41 Parap.sp., 2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z721	
0	0	0	0	0	0	0	27	QLD85z722	62 Parap.sp.
0	0	0	0	0	0	1	0	QLD85z723	
0	0	0	0	0	0	0	7	QLD85z724	7 Nymph.sp. 32 Parap.sp.
0	0	0	0	0	0	0	0	QLD85z801	2 Pyral.(A)
0	0	0	0	0	0	0	1	QLD85z802	4 Nymph.sp.
0	0	0	1	0	1	0	5	QLD85z803	6 Nymph.sp.
0	0	0	0	1	1	0	23	QLD85z804	26 Nymph.sp.
0	0	0	3	0	3	0	0	QLD85z805	
2	0	0	0	0	0	0	5	QLD85z806	8 Nymph.sp.
0	0	0	3	1	4	0	0	QLD85z807	
0	0	0	2	1	3	0	1	QLD85z808	4 Nymph.sp.
0	0	0	0	0	0	0	12	QLD85z809	18 Nymph.sp.
0	0	0	0	3	3	0	0	QLD85z810	
1	0	0	0	0	0	0	7	QLD85z811	13 Nymph.sp., 4 Parap.sp.
0	0	0	0	1	1	0	1	QLD85z812	one possible Nymph.sp. (A)
0	0	0	0	0	0	0	3	QLD85z813	8 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z814	
0	0	0	0	0	0	0	0	QLD85z815	
0	0	0	0	0	0	0	1	QLD85z816	1 Parap.sp.
0	0	0	0	0	0	0	19	QLD85z817	86 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z818	
0	0	0	0	0	0	0	20	QLD85z819	20 Nymph.sp.,listed in books 3 & 4
0	0	0	0	0	0	0	8	QLD85z820	62 Nymph.sp.
0	0	0	1	0	1	0	0	QLD85z821	
0	0	0	0	0	0	0	0	QLD85z822	
0	0	0	0	0	0	0	4	QLD85z823	4 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z824	
0	0	0	0	0	0	0	0	QLD85z825	
0	0	0	0	0	0	0	0	QLD85z826	
0	0	0	0	0	0	0	7	QLD85z827	7 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z828	
0	0	0	0	1	1	0	0	QLD85z829	
0	0	0	0	0	0	0	0	QLD85z830	
0	0	0	0	0	0	0	9	QLD85z831	9 Nymph.sp.
0	0	0	0	0	0	0	0	QLD85z832	
0	0	0	0	0	0	0	0	QLD85z833	
0	0	0	0	0	0	0	0	QLD85z834	
0	0	0	0	0	0	0	0	QLD85z835	
0	29	0	0	0	0	0	13	QLD86z101	57 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z102	
0	0	0	0	0	0	0	1	QLD86z103	2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z104	
0	0	0	0	0	0	0	1	QLD86z105	10 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z106	

0	0	0	0	0	0	0	1	QLD86z107	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z108	
0	0	0	0	0	0	0	0	QLD86z109	
0	0	0	0	0	0	0	0	QLD86z110	
0	0	0	0	0	0	0	3	QLD86z111	3 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z112	
0	0	0	0	0	0	0	0	QLD86z113	
0	0	0	0	0	0	0	0	QLD86z114	
0	0	0	0	0	0	0	0	QLD86z115	
0	0	0	0	0	0	0	0	QLD86z116	
0	0	0	0	0	0	0	1	QLD86z117	2 Nymph.sp. (L), 1 Parap.sp. (A)
0	0	0	0	0	0	0	0	QLD86z118	
0	0	0	0	0	0	0	0	QLD86z119	
0	0	0	0	0	0	0	0	QLD86z150	can't find berlese wts.
0	0	0	0	0	0	0	1	QLD86z151	1 Parap.sp. (A), 2 Argy. (L)
0	0	0	0	0	0	0	50	QLD86z152	67 Parap.sp.
0	0	0	0	0	0	0	7	QLD86z153	15 Argy.
0	0	0	0	0	0	0	0	QLD86z154	1 Nymph.sp.
0	0	0	0	0	0	0	3	QLD86z155	1 Parap.sp., 2 Argy.
0	0	0	0	0	0	0	0	QLD86z156	can't find berlese wts.
0	0	0	0	0	0	0	0	QLD86z157	
0	0	0	0	0	0	0	1	QLD86z158	1 Parap.sp.,suspect dry wts.
0	0	0	0	1	1	0	10	QLD86z159	13 Parap.sp.,can't find wts.
0	0	0	0	0	0	0	5	QLD86z160	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z161	4 Parap.sp.
0	0	0	0	0	0	1	3	QLD86z162	6 Parap.sp.
0	0	0	0	0	0	0	1	QLD86z163	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z164	1 Argy.
0	0	0	0	0	0	0	0	QLD86z165	
0	0	0	0	0	0	0	0	QLD86z166	
0	0	0	1	0	1	0	0	QLD86z167	
0	0	0	0	0	0	0	0	QLD86z168	
0	0	0	0	0	0	0	0	QLD86z169	
0	0	0	0	0	0	0	0	QLD86z170	
0	0	0	0	0	0	0	1	QLD86z171	3 Argy.
0	0	0	0	1	1	0	0	QLD86z172	
0	0	0	[illegible]	2	4	0	0	QLD86z173	
0	0	0	0	0	0	0	0	QLD86z174	
0	0	0	0	0	0	0	0	QLD86z175	
0	0	0	0	0	0	0	0	QLD86z176	
0	0	0	0	0	0	0	2	QLD86z177	6 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z178	
0	0	0	0	0	0	0	0	QLD86z179	
0	0	0	0	0	0	0	0	QLD86z180	
0	0	0	0	0	0	0	0	QLD86z181	
0	0	0	44	11	55	0	0	QLD86z201	201.3 is actually 202
0	0	0	13	10	23	0	18	QLD86z202	29 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z203	only 2 berleses in I.D.book
0	0	0	0	3	3	0	1	QLD86z204	4 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z205	
0	0	0	17	6	23	0	0	QLD86z206	
0	0	0	0	0	0	0	0	QLD86z207	
0	0	0	0	0	0	0	0	QLD86z208	
0	0	0	0	0	0	0	0	QLD86z209	
0	0	0	0	0	0	0	0	QLD86z210	
0	0	0	0	0	0	0	0	QLD86z211	

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	QLD86z217	
0	0	0	0	0	0	0	0	QLD86z218	
0	0	0	3	0	3	0	13	QLD86z219	26 Parap.sp.
0	0	0	0	0	0	0	1	QLD86z220	1 Parap.sp.
0	0	0	0	2	2	1	0	QLD86z221	
0	0	0	0	0	0	0	0	QLD86z222	
0	0	0	0	0	0	0	0	QLD86z223	
0	0	0	0	0	0	0	0	QLD86z224	
0	0	0	0	0	0	0	1	QLD86z225	1 Parap.sp.
0	0	0	1	2	3	0	1	QLD86z226	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z227	
0	0	0	2	0	2	0	10	QLD86z228	12 Parap.sp., 2 Nymph.sp.
0	0	0	153	13	166	0	12	QLD86z229	44 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z230	52 Parap.sp.
0	0	0	0	2	2	0	4	QLD86z231	18 Parap.sp.
0	0	0	80	1	81	0	0	QLD86z232	
0	0	0	0	0	0	0	49	QLD86z233	46 Argy., 18 Parap.sp.
0	0	0	0	0	0	0	1	QLD86z234	1 Parap.sp.
0	0	0	20	2	22	0	2	QLD86z235	11 Parap.sp.
0	0	0	115	45	160	0	15	QLD86z236	70 Parap.sp.
0	0	0	0	0	0	0	6	QLD86z237	57 Argy.
0	0	0	0	5	5	0	0	QLD86z238	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z239	1 Nymph.sp.
0	0	0	1	2	3	0	0	QLD86z240	
0	0	0	0	0	0	0	0	QLD86z241	
0	0	0	0	0	0	0	0	QLD86z242	
0	0	0	0	0	0	0	0	QLD86z243	
0	0	0	64	3	67	0	6	QLD86z244	7 Parap.sp. (6L & 1A)
0	0	0	9	8	17	0	2	QLD86z245	3 Parap.sp.
0	0	0	0	0	0	0	3	QLD86z246	9 Parap.sp., 1 Nymph.sp.
0	0	0	0	1	1	0	9	QLD86z247	6 Parap.sp., 3 Nymph.sp.
0	0	0	2	0	2	0	6	QLD86z248	17 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z249	
0	0	0	0	0	0	0	0	QLD86z250	3 Parap.sp.
0	0	0	0	0	0	4	0	QLD86z251	
0	0	0	5	1	6	0	0	QLD86z252	
0	0	0	0	0	0	0	0	QLD86z253	
0	0	0	0	0	0	0	0	QLD86z254	
0	0	0	0	1	1	0	0	QLD86z255	
0	0	0	82	32	114	0	0	QLD86z256	
0	0	0	11	0	11	0	0	QLD86z257	1 Parap.sp.
0	0	0	8	0	8	0	0	QLD86z258	
0	0	0	1	0	1	0	0	QLD86z259	2 Argy.sp.
0	0	0	74	0	74	1	1	QLD86z260	1 Nymph.sp.
0	0	0	0	0	0	0	1	QLD86z261	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z262	
0	0	0	1	0	1	0	0	QLD86z263	
0	0	0	0	0	0	0	0	QLD86z264	
0	0	0	2	0	2	0	0	QLD86z265	
0	0	0	0	0	0	0	0	QLD86z266	can't find berlese wts.
0	0	0	0	0	0	0	11	QLD86z267	21 Argy.sp.
0	0	0	16	20	36	0	0	QLD86z268	
0	0	0	4	0	4	0	0	QLD86z269	
0	0	0	18	2	20	0	0	QLD86z270	
0	0	0	0	0	0	0	0	QLD86z271	

0	0	0	2	5	7	0	1	QLD86z272	1 Parap.sp.
0	0	0	4	6	10	0	0	QLD86z273	
0	0	0	0	0	0	0	23	QLD86z274	23 Argy.
0	0	0	47	20	67	0	5	QLD86z275	5 Parap.sp.
0	0	0	112	7	119	0	1	QLD86z276	1 Parap.sp.
0	0	0	38	5	43	0	0	QLD86z277	
0	0	0	0	0	0	0	4	QLD86z278	4 Parap.sp.
0	0	0	30	1	31	0	1	QLD86z279	1 Parap.sp.
0	0	0	11	0	11	0	0	QLD86z280	
0	0	0	3	0	3	0	7	QLD86z281	7 Parap.sp.
0	0	0	0	0	0	0	6	QLD86z282	6 Parap.sp.
0	0	0	70	1	71	0	2	QLD86z283	2 Parap.sp.
0	0	0	1	0	1	0	0	QLD86z284	
0	0	0	1	11	12	0	0	QLD86z285	
0	0	0	1	1	2	0	3	QLD86z286	3 Parap.sp.
0	0	0	4	2	6	0	0	QLD86z287	
0	0	0	0	0	0	0	0	QLD86z288	
0	0	0	0	0	0	0	0	QLD86z289	
0	0	0	11	1	12	1	0	QLD86z290	
0	0	0	18	0	18	0	7	QLD86z291	7 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z292	
0	0	0	0	0	0	0	19	QLD86z293	19 Argy.
0	0	0	1	0	1	0	3	QLD86z294	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z295	
0	0	0	0	0	0	0	0	QLD86z296	
0	0	0	0	0	0	0	0	QLD86z297	
0	0	0	1	2	3	0	6	QLD86z298	6 Parap.sp.
0	0	0	2	0	2	2	0	QLD86z299	
0	0	0	1	1	2	9	0	QLD86z300	
0	0	0	0	0	0	0	0	QLD86z301	
0	0	0	0	0	0	0	0	QLD86z302	
0	0	0	0	0	0	0	4	QLD86z350	5 Parap.sp.
0	0	0	0	0	0	6	0	QLD86z351	
0	0	0	0	0	0	0	0	QLD86z352	
0	0	0	0	0	0	1	3	QLD86z353	5 Argy.
0	0	0	0	2	2	0	0	QLD86z354	
0	0	0	0	0	0	0	0	QLD86z355	suspect dry wts.
0	0	0	0	0	0	0	1	QLD86z356	1 Parap.sp.
0	0	0	0	0	0	0	1	QLD86z357	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z358	
0	0	0	0	2	2	0	3	QLD86z359	6 Argy.
0	0	0	0	0	0	0	0	QLD86z360	
0	0	0	0	0	0	0	1	QLD86z361	4 Argy.
0	0	0	0	0	0	0	0	QLD86z362	
0	0	0	0	0	0	0	0	QLD86z363	
0	0	0	1	0	1	0	16	QLD86z364	14 Parap.sp. 21 Argy.
0	0	0	1	0	1	0	0	QLD86z365	
0	0	0	2	0	2	0	8	QLD86z366	12 Argy.
0	0	0	0	0	0	0	1	QLD86z367	Nymph.sp. 1(A) 1(L)
0	0	0	0	0	0	0	0	QLD86z368	
0	0	0	2	0	2	0	8	QLD86z369	19 Argy.
0	0	0	0	0	0	0	0	QLD86z370	
0	0	0	0	0	0	0	0	QLD86z371	
0	0	0	0	0	0	0	0	QLD86z372	
0	0	0	0	0	0	0	44	QLD86z401	51 Parap.sp.
0	0	0	0	1	1	0	5	QLD86z402	15 Parap.sp.
0	0	0	3	1	4	0	0	QLD86z403	4 Nymph.sp., 24 Parap.sp.
0	0	0	0	0	0	0	50	QLD86z404	49 Parap.sp., 1 Nymph.sp.
0	0	0	0	1	1	0	8	QLD86z405	5 Nymph.sp., 5 Parap.sp.
0	0	0	0	0	0	0	2	QLD86z406	2 Parap.sp.

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	1	1	2	0	0	QLD86z412	
0	0	0	0	0	0	0	0	QLD86z413	35 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z414	
0	0	0	0	0	0	0	0	QLD86z415	
0	0	0	0	0	0	0	0	QLD86z416	
0	0	0	0	0	0	0	0	QLD86z417	6 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z451	
0	0	0	0	0	0	0	0	QLD86z452	
0	0	0	0	0	0	0	1	QLD86z453	1 Lepid.(L)
0	0	0	0	0	0	0	0	QLD86z454	
0	0	0	0	3	3	0	0	QLD86z455	Parap.sp. 12(A) 1(L)
0	0	0	0	0	0	0	0	QLD86z501	5 Parap.sp.
0	0	0	0	0	0	0	2	QLD86z502	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z503	34 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z504	
0	0	0	0	0	0	0	0	QLD86z505	
0	0	0	0	0	0	0	0	QLD86z506	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z507	
0	0	0	0	0	0	0	0	QLD86z508	
0	0	0	0	0	0	0	0	QLD86z509	1 Parap.sp., 2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z510	
0	0	0	0	0	0	0	0	QLD86z551	
0	0	0	0	0	0	0	0	QLD86z552	
0	0	0	0	0	0	0	0	QLD86z553	
0	0	0	0	0	0	6	0	QLD86z554	
0	0	0	0	0	0	0	0	QLD86z555	49 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z556	
0	0	0	0	0	0	0	0	QLD86z557	
0	0	0	0	2	2	0	0	QLD86z558	12 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z559	
0	0	0	0	0	0	0	0	QLD86z560	2 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z561	
0	0	0	0	0	0	0	0	QLD86z562	6 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z563	
0	0	0	0	0	0	0	0	QLD86z564	6 Parap.sp.,?berlese wts.
0	0	0	0	0	0	0	0	QLD86z565	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z566	23 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z567	
0	0	0	0	1	1	0	0	QLD86z568	
0	0	0	0	0	0	0	0	QLD86z569	
0	0	0	0	0	0	0	0	QLD86z570	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z571	7 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z572	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z573	
0	0	0	0	0	0	0	0	QLD86z574	
0	0	0	0	0	0	0	0	QLD86z575	
0	0	0	0	0	0	0	0	QLD86z576	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z577	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z578	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z579	1 Nymph.sp.
0	0	0	1	0	1	0	0	QLD86z580	
0	0	0	0	0	0	0	0	QLD86z581	
0	0	0	0	0	0	0	0	QLD86z582	10 Parap.sp., 2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z583	8 Parap.sp., 12 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z584	
0	0	0	0	0	0	0	0	QLD86z585	
0	0	0	0	0	0	0	0	QLD86z586	
0	0	0	0	0	0	0	0	QLD86z587	

0	0	0	0	0	0	0	0	QLD86z588	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z589	
0	0	0	0	0	0	0	0	QLD86z590	
0	0	0	0	0	0	0	0	QLD86z591	
0	0	0	0	0	0	0	0	QLD86z592	
0	0	0	0	0	0	0	0	QLD86z593	7 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z594	
0	0	0	0	0	0	0	0	QLD86z595	
0	0	0	0	1	1	0	0	QLD86z601	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z602	
0	0	0	3	0	3	0	0	QLD86z603	
0	0	0	0	0	0	0	0	Qld86z604	
0	0	0	0	0	0	0	0	QLD86z605	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z606	
0	0	0	0	0	0	0	0	QLD86z607	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z608	
0	0	0	0	0	0	0	0	QLD86z609	
0	0	0	0	0	0	0	0	QLD86z610	34 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z611	
0	0	0	1	0	1	0	0	QLD86z612	3 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z613	
0	0	0	0	0	0	0	0	QLD86z614	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z615	10 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z616	6 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z617	
0	0	0	1	0	1	0	0	QLD86z618	
0	0	0	0	0	0	1	0	QLD86z619	
0	0	0	2	1	3	0	0	QLD86z620	6 Parap.sp., 3 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z621	
0	0	0	0	0	0	0	0	QLD86z622	
0	0	0	0	0	0	0	0	QLD86z623	
0	0	0	0	0	0	0	0	QLD86z624	12 Parap.sp., 2 '624s' in I.D. book
0	0	1	1	1	2	0	0	QLD86z625	
0	0	0	0	0	0	0	0	QLD86z626	
0	0	0	0	0	0	0	0	QLD86z627	24 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z628	
0	0	0	0	0	0	0	0	QLD86z629	
0	0	0	0	0	0	0	0	QLD86z630	
0	0	0	0	0	0	0	0	QLD86z631	
0	0	0	0	0	0	0	0	QLD86z650	
0	0	0	0	0	0	0	0	QLD86z651	
0	0	0	0	0	0	0	0	QLD86z652	1 Nymph.sp.
0	0	0	0	1	1	0	0	QLD86z653	
0	0	0	0	0	0	0	0	QLD86z654	
0	0	0	0	0	0	0	0	QLD86z655	
0	0	0	0	0	0	0	0	QLD86z656	
0	0	0	0	0	0	0	0	QLD86z657	1 Parap.sp.
0	0	2	0	0	0	0	0	QLD86z658	6 Nymph.sp., 9 Parap.sp.
0	0	0	0	1	1	0	0	QLD86z659	
0	0	1	0	8	8	0	0	QLD86z660	1 Nymph.sp., 2 '660s' in I.D. book
0	0	0	0	1	1	0	0	QLD86z661	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z662	
0	0	0	0	0	0	0	0	QLD86z663	3 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z664	
0	0	0	0	1	1	0	0	QLD86z665	Argy.9(L) 1(A)
0	0	0	0	0	0	0	0	QLD86z666	

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	QLD86z703	22 Parap.sp., 2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z704	81 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z705	11 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z706	
0	0	0	0	0	0	0	0	QLD86z707	32 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z708	
0	0	0	0	0	0	0	0	QLD86z709	7 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z710	70 Parap.sp. (68(L) & 2(A)), 4 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z711	12 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z712	wet wt. not recorded
0	0	0	1	0	1	0	0	QLD86z713	3 Nymph.sp., 46 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z714	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z715	18 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z716	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z717	
0	0	0	0	0	0	0	0	QLD86z718	
0	0	0	0	0	0	0	0	QLD86z719	
0	0	0	0	0	0	0	0	QLD86z720	1 Nymph.sp. (A)
0	0	0	0	0	0	0	0	QLD86z721	1 Nymph.sp. (A)
0	0	0	1	0	1	0	0	QLD86z801	4 Parap.sp., 6 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z802	20 Nymph.sp.,1 moth
0	0	0	0	0	0	0	0	QLD86z803	
0	0	0	1	0	1	0	0	QLD86z804	
0	0	0	0	0	0	0	0	QLD86z805	
0	0	0	0	0	0	0	0	QLD86z806	
2	0	0	0	0	0	0	0	QLD86z807	46 Nymph.sp., ? Parap.sp.
0	0	0	0	0	0	0	0	QLD86z808	48 Nymph.sp., 1 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z809	61 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z810	
0	0	0	0	0	0	0	0	QLD86z811	
0	0	0	2	0	2	0	0	QLD86z812	3 Nymph.sp.
9	0	0	0	0	0	0	0	QLD86z813	39 Nymph.sp., 2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z814	
0	0	0	0	0	0	0	0	QLD86z815	
0	0	0	0	3	3	0	0	QLD86z816	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z817	
0	0	0	0	0	0	0	0	QLD86z818	2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z819	
0	0	0	0	0	0	0	0	QLD86z820	
0	0	0	9	0	9	0	0	QLD86z821	3 Parap.sp., 7 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z822	Parap.sp. 1(L), 1(A)
0	0	0	0	0	0	0	0	QLD86z823	
0	0	0	0	0	0	0	0	QLD86z824	2 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z825	
0	0	0	0	0	0	0	0	QLD86z826	
0	0	0	0	0	0	0	1	QLD86z827	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z828	
0	0	0	0	0	0	0	0	QLD86z829	
0	0	0	0	0	0	0	0	QLD86z830	Nymph.sp. 1(A), 1(L)
0	0	0	0	0	0	0	0	QLD86z831	10 Nymph.sp.
0	0	0	0	0	0	0	0	QLD86z832	
0	0	0	0	0	0	0	0	QLD86z833	
0	0	0	0	0	0	0	0	QLD86z834	
0	0	0	0	0	0	0	0	QLD86z835	
0	0	0	0	0	0	0	0	QLD86z836	
0	0	0	0	0	0	0	0	QLD86z837	
0	0	0	0	0	0	0	0	QLD86z901	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD86z902	

0	0	0	0	0	0	0	0	QLD87z101	
0	0	0	0	0	0	0	0	QLD87z102	
0	0	0	0	0	0	0	0	QLD87z103	
0	0	0	0	0	0	0	0	QLD87z104	
0	0	0	0	3	3	0	0	QLD87z106	
0	75	0	0	0	0	0	0	QLD87z107	84 Lepid., 1 Ndic.
0	0	0	0	0	0	0	0	QLD87z108	
0	0	0	0	0	0	0	0	QLD87z150	
0	0	0	0	0	0	0	0	QLD87z151	3 Parap.sp., 2 Argy.
0	0	0	0	0	0	0	0	QLD87z152	
0	0	0	0	0	0	0	0	QLD87z153	6 Argy.
0	0	0	0	0	0	0	0	QLD87z154	
0	0	0	0	0	0	0	0	QLD87z155	6 Argy.
0	0	0	0	0	0	0	0	QLD87z156	
0	0	0	0	0	0	0	0	QLD87z157	
0	0	0	0	0	0	0	0	QLD87z158	20 Argy.
0	0	0	0	0	0	0	0	QLD87z159	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z160	16 Parap.sp., 1 Argy.
0	0	0	0	0	0	0	0	QLD87z161	22 Argy.
0	0	0	0	0	0	0	0	QLD87z162	16 Argy.
0	0	0	0	0	0	0	0	QLD87z163	38 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z164	103 Argy., 24 Ndic.
0	0	0	0	0	0	0	0	QLD87z165	21 Argy., 1 Ndic.
0	0	0	0	0	0	0	0	QLD87z166	80 Argy., 14 Ndic.
0	0	0	0	0	0	0	0	QLD87z167	3 Argy., 7 Ndic.
0	0	0	0	0	0	0	0	QLD87z168	12 Argy.
0	0	0	0	0	0	0	0	QLD87z169	Argy. 21(L),1(A), 4 Ndic.
0	0	0	0	0	0	0	0	QLD87z170	129 Argy., 22 Ndic.
0	0	0	0	0	0	0	0	QLD87z171	1 Parap.sp., 75 Argy., 1 Ndic.
0	0	0	0	0	0	0	0	QLD87z172	5 Argy.
0	0	0	0	0	0	0	0	QLD87z173	58 Argy., 7 Ndic.
0	0	0	0	0	0	0	0	QLD87z174	7 Argy.
0	0	0	0	0	0	0	0	QLD87z175	
0	0	0	0	0	0	0	0	QLD87z176	2 Ndic.
0	0	0	0	0	0	0	0	QLD87z177	6 Argy.
0	0	0	0	0	0	0	0	QLD87z178	12 Argy.
0	0	0	0	0	0	0	0	QLD87z179	
0	0	0	0	0	0	0	0	QLD87z180	3 Argy.
0	0	0	0	0	0	0	0	QLD87z181	30 Argy., 1 Ephyd.(L)
0	0	0	0	0	0	0	0	QLD87z182	4 Argy., 1 Ephyd.(L)
0	0	0	1	0	1	1	0	QLD87z201	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z202	
0	0	0	10	0	10	0	0	QLD87z203	
0	0	0	5	1	6	0	0	QLD87z204	
0	0	0	1	0	1	0	0	QLD87z205	
0	0	0	29	1	30	0	0	QLD87z206	
0	0	0	0	0	0	0	0	QLD87z207	
0	0	0	0	0	0	0	0	QLD87z208	
0	0	0	0	0	0	0	0	QLD87z209	32 Argy.
0	0	0	2	1	3	0	0	QLD87z210	1 Parap.sp.
0	0	0	1	0	1	0	0	QLD87z211	6 Parap.sp., 2 Nymph.
0	0	0	1	0	1	3	0	QLD87z212	
0	0	0	21	5	26	0	0	QLD87z213	35 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z214	
0	0	0	0	0	0	0	0	QLD87z215	
0	0	0	0	0	0	0	0	QLD87z216	99 Argy.

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	30	2	32	0	0	QLD87z223	5 Parap.sp.
0	0	0	3	1	4	0	0	QLD87z224	4 Parap.sp.
0	0	0	2	1	3	0	0	QLD87z225	12 Parap.sp.
0	0	0	155	0	155	0	0	QLD87z226	9 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z227	17 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z228	
0	0	0	0	0	0	0	0	QLD87z229	
0	0	0	341	98	439	0	0	QLD87z230	2 Nymph.sp., 1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z231	
0	0	0	0	0	0	0	0	QLD87z232	5 Ndic.
0	0	0	0	0	0	0	0	QLD87z233	96 Argy., 1 Ndic.
0	0	0	17	17	34	0	0	QLD87z234	
0	0	0	2	0	2	0	0	QLD87z235	1 Ndic.
0	0	0	5	0	5	0	0	QLD87z236	1 Ndic.
0	0	0	0	0	0	0	0	QLD87z237	62 Argy., 3 Nymph.sp.
0	0	0	0	1	1	0	0	QLD87z238	17 Ndic.,2 Parap.,1 Ephyd.(L)
0	0	0	0	0	0	0	0	QLD87z239	
0	0	0	0	0	0	0	0	QLD87z240	
0	0	0	0	0	0	0	0	QLD87z241	1 Ndic.
0	0	0	0	0	0	0	0	QLD87z242	32 Argy.
0	0	0	0	1	1	0	0	QLD87z243	1 Ndic.
0	0	0	49	13	62	0	0	QLD87z244	
0	0	0	0	0	0	0	0	QLD87z245	32 Argy.
0	0	0	0	0	0	0	0	QLD87z246	
0	0	0	0	0	0	0	0	QLD87z247	
0	0	0	21	1	22	4	0	QLD87z248	2 Ndic.
0	0	0	0	0	0	0	0	QLD87z249	79 Argy.
0	0	0	0	0	0	0	0	QLD87z250	
0	0	0	0	0	0	0	0	QLD87z251	124 Argy.
0	0	0	0	0	0	0	0	QLD87z252	
0	0	0	67	9	76	1	0	QLD87z253	
0	0	0	0	1	1	0	0	QLD87z254	154 Argy.
0	0	0	0	0	0	0	0	QLD87z255	1 Argy.
0	0	0	0	0	0	0	0	QLD87z350	
0	0	0	1	0	1	0	0	QLD87z351	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z352	4 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z353	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z354	6 Argy.
0	0	0	0	0	0	0	0	QLD87z355	6 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z356	28 Argy.
0	0	0	0	0	0	0	0	QLD87z357	33 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z358	28 Argy.
0	0	0	0	2	2	0	0	QLD87z359	
0	0	0	0	0	0	0	0	QLD87z360	32 Argy.
0	0	0	0	0	0	0	0	QLD87z361	48 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z362	30 Ndic.
0	0	0	2	1	3	0	0	QLD87z363	11 Argy.
0	0	0	0	0	0	0	0	QLD87z364	21 Argy.
0	0	0	0	0	0	0	0	QLD87z365	29 Argy.
0	0	0	0	0	0	0	0	QLD87z366	12 Argy.
0	0	0	0	0	0	0	0	QLD87z367	
0	0	0	0	0	0	0	0	QLD87z368	16 Argy.
0	0	0	0	0	0	0	0	QLD87z369	26 Argy.
0	0	0	0	0	0	0	0	QLD87z370	52 Argy., 3 Ephyd.(L)
0	0	0	3	2	5	0	0	QLD87z400	3 Nymph.sp., Parap.sp. 2(L) & 1(A)
0	0	0	0	0	0	0	0	QLD87z401	17 Parap.sp., 2 Nymph.sp.
0	0	0	25	0	25	0	0	QLD87z402	48 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z403	65 Ndic.,1 P#8
0	0	0	0	0	0	0	0	QLD87z404	
0	0	0	0	0	0	0	0	QLD87z405	

0	0	0	0	0	0	0	0	QLD87z406	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z501	
0	0	0	0	0	0	0	0	QLD87z502	
0	0	0	0	0	0	0	0	QLD87z503	
0	0	0	0	0	0	0	0	QLD87z504	
0	0	0	0	0	0	0	0	QLD87z505	8 Ndic., 1 Argy.
0	0	0	0	0	0	0	0	QLD87z506	1 Argy.
0	0	0	0	0	0	0	0	QLD87z507	
0	0	0	0	0	0	0	0	QLD87z551	1 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z552	2 Parap.sp., 1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z553	
0	0	0	0	0	0	0	0	QLD87z554	2 Parap.sp.
0	0	0	0	1	1	0	0	QLD87z555	33 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z556	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z557	
0	0	0	0	0	0	0	0	QLD87z558	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z559	
0	0	0	0	0	0	0	0	QLD87z560	86 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z561	
0	0	0	0	0	0	0	0	QLD87z562	16 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z563	43 Parap.sp.
0	0	0	22	2	24	0	0	QLD87z564	Parap.sp. 43(L) & 1(A)
0	0	0	0	0	0	0	0	QLD87z565	12 Ndic.
0	0	0	0	0	0	0	0	QLD87z566	2 Ndic.
0	0	0	2	0	2	0	0	QLD87z567	
0	0	0	0	0	0	0	0	QLD87z568	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z569	
0	0	0	0	0	0	0	0	QLD87z570	1 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z571	
0	0	0	0	0	0	0	0	QLD87z572	
0	0	0	0	0	0	0	1	QLD87z573	1 unid.Lepid.
0	0	0	0	0	0	0	0	QLD87z574	
0	0	0	0	0	0	0	0	QLD87z575	
0	0	0	0	0	0	0	0	QLD87z576	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z600	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z601	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z602	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z603	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z604	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z605	
0	0	0	0	0	0	0	0	QLD87z606	
0	0	0	0	0	0	0	0	QLD87z607	2 Ndic.
0	0	0	0	0	0	0	0	QLD87z608	
0	0	0	0	0	0	0	0	QLD87z609	
0	0	0	0	0	0	0	0	QLD87z610	
0	0	0	0	0	0	0	0	QLD87z651	
0	0	16	0	0	0	0	0	QLD87z652	39 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z653	
0	0	0	0	0	0	0	0	QLD87z654	1 Argy.
0	0	20	0	0	0	0	22	QLD87z655	4 Nymph.sp., 22 Lepid.
0	0	0	0	0	0	0	0	QLD87z656	
0	0	0	0	0	0	0	0	QLD87z657	
0	0	19	0	0	0	0	0	QLD87z658	11 Ndic., 6 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z700	
0	0	0	0	0	0	0	0	QLD87z701	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z702	
0	0	0	0	0	0	0	0	QLD87z703	
0	0	0	0	0	0	5	0	QLD87z704	2 Parap.sp., 3 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z705	4 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z706	1 Parap.sp.

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	QLD87z707	20 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z708	69 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z709	22 Nymph.sp., 13 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z710	
0	0	0	0	0	0	0	0	QLD87z711	3 Nymph.sp., 1 Ndic.
0	0	0	0	0	0	0	0	QLD87z712	
0	0	0	0	0	0	0	0	QLD87z713	9 Nymph.sp.
0	0	0	0	0	0	0	0	QLD87z714	6 Ndic.
0	0	0	0	0	0	0	0	QLD87z715	
0	0	0	0	0	0	0	0	QLD87z800	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD87z801	
0	0	0	0	0	0	0	0	QLD87z802	
0	0	0	0	0	0	0	0	QLD87z803	
0	0	0	0	0	0	0	0	QLD87z804	
0	0	0	0	0	0	0	0	QLD87z805	
0	0	0	0	0	0	0	0	QLD87z806	Ephyd.,28(L),3(A)
0	0	0	1	0	1	0	0	QLD87z807	6 Ephyd (L) not Hydrellia
0	0	0	0	0	0	0	0	QLD87z808	
0	0	0	0	0	0	0	0	QLD88L01	
0	0	0	0	0	0	0	0	QLD88L02	
0	0	0	0	0	0	0	0	QLD88L03	
0	0	0	0	0	0	0	0	QLD88z100	
0	0	0	0	0	0	0	69	QLD88z151	5 Ndic., 69 early instar caterpillars
0	0	0	0	0	0	0	0	QLD88z152	
0	0	0	0	0	0	0	2	QLD88z153	1 Parap.sp., 2 small caterpillars
0	0	0	0	0	0	0	31	QLD88z154	31 small caterpillars
0	0	0	0	0	0	0	0	QLD88z155	
0	0	0	0	0	0	0	0	QLD88z156	
0	0	0	1	0	1	0	5	QLD88z157	5 early instars
0	0	0	0	0	0	0	70	QLD88z158	70 hatchlings
0	0	0	0	0	0	0	4	QLD88z159	2 early instarts, 2 unid.
0	0	0	0	0	0	0	2	QLD88z160	2 unid.
0	0	0	0	0	0	0	0	QLD88z161	
0	0	0	0	0	0	0	0	QLD88z162	
0	0	0	0	0	0	0	15	QLD88z163	
0	0	0	0	0	0	0	0	QLD88z164	
0	0	0	0	0	0	0	1	QLD88z165	1 unid.
0	0	0	0	0	0	0	1	QLD88z166	
0	0	0	0	0	0	0	0	QLD88z201	1 Ndic.
0	0	0	0	0	0	0	2	QLD88z202	2 Pyral.
0	0	0	14	3	17	0	2	QLD88z203	2 early instars
0	0	0	1	3	4	0	0	QLD88z204	
0	0	0	3	0	3	0	26	QLD88z205	26 early instars
0	0	0	22	2	24	0	0	QLD88z206	
0	0	0	0	0	0	0	10	QLD88z207	10 small caterpillars
0	0	0	0	0	0	0	1	QLD88z208	1 early instar
0	0	0	0	0	0	0	0	QLD88z209	
0	0	0	0	0	0	0	65	QLD88z210	65 early instars
0	0	0	3	0	3	0	8	QLD88z211	8 early instars
0	0	0	22	10	32	0	22	QLD88z212	22 early instars
0	0	0	0	0	0	0	3	QLD88z213	3 early instars
0	0	0	1	0	1	0	29	QLD88z214	29 early instars
0	0	0	174	13	187	0	0	QLD88z215	
0	0	0	0	0	0	0	69	QLD88z216	63 early instars, 6 unid.
0	0	0	0	0	0	0	8	QLD88z217	8 early instars
0	0	0	218	17	235	8	4	QLD88z218	
0	0	0	0	0	0	0	1	QLD88z219	1 early instar
0	0	0	6	3	9	0	24	QLD88z220	24 early instars
0	0	0	0	0	0	0	6	QLD88z221	6 unid.
0	0	0	0	1	1	0	9	QLD88z222	9 early instars.
0	0	0	0	0	0	0	1	QLD88z223	1 unknown
0	0	0	0	0	0	0	0	QLD88z224	
0	0	0	0	0	0	0	0	QLD88z225	

0	0	0	0	0	0	0	0	QLD88z226	
0	0	0	1	0	1	0	0	QLD88z227	
0	0	0	1	0	1	0	6	QLD88z228	
0	0	0	0	0	0	0	0	QLD88z229	
0	0	0	3	0	3	0	1	QLD88z230	1 unknown
0	0	0	0	0	0	0	3	QLD88z231	
0	0	0	0	0	0	0	0	QLD88z232	
0	0	0	0	0	0	0	35	QLD88z351	1 Ndic., 35 early instars
0	0	0	0	0	0	0	4	QLD88z352	4 small caterpillars
0	0	0	0	0	0	0	0	QLD88z353	
0	0	0	0	0	0	0	1	QLD88z354	1 early instar
0	0	0	0	0	0	0	6	QLD88z355	6 early instars
0	0	0	0	0	0	0	0	QLD88z356	
0	0	0	0	0	0	0	130	QLD88z357	130 hatchlings
0	0	0	0	0	0	0	373	QLD88z358	370 hatchlings, 1 early instar, 2 unid.
0	0	0	0	0	0	0	8	QLD88z359	8 early instars,1 Ephyd.(L)
0	0	0	0	0	0	0	0	QLD88z360	2 Ephyd.(L)
0	0	0	1	0	1	0	0	QLD88z361	5 Ephyd.(L)
0	0	0	0	0	0	0	0	QLD88z362	
0	0	0	0	0	0	0	7	QLD88z363	5 unid., 2 early instars
0	0	0	0	0	0	0	0	QLD88z364	
0	0	0	0	0	0	0	0	QLD88z365	
0	0	0	0	0	0	0	3	QLD88z366	
0	0	0	0	0	0	0	0	QLD88z367	
0	0	0	0	0	0	0	0	QLD88z368	
0	0	0	0	0	0	0	9	QLD88z369	9 unid.
0	0	0	0	0	0	0	1	QLD88z370	
0	0	0	0	0	0	0	0	QLD88z371	
0	0	0	4	0	4	0	1	QLD88z401	1 early instar
0	0	0	2	0	2	0	3	QLD88z402	3 early instars
0	0	0	0	0	0	0	18	QLD88z403	18 unknown
0	0	0	0	0	0	0	0	QLD88z404	
0	0	0	0	0	0	0	7	QLD88z405	7 unknown
0	0	0	0	0	0	0	1	QLD88z406	
0	0	0	0	0	0	0	6	QLD88z407	
0	0	0	0	0	0	0	6	QLD88z501	2 Parap.sp., 6 early instars
0	0	0	0	0	0	0	2	QLD88z502	2 early instars
0	0	0	0	0	0	0	0	QLD88z503	
0	0	0	0	0	0	0	4	QLD88z504	4 unid.
0	0	0	0	0	0	0	0	QLD88z551	
0	0	0	1	0	1	0	2	QLD88z552	2 early instars.
0	0	0	0	0	0	0	4	QLD88z553	4 early instars
0	0	0	0	0	0	0	1	QLD88z554	1 Parap.sp., 1 early instar
0	0	0	0	0	0	0	8	QLD88z555	8 early instars.
0	0	0	0	0	0	0	0	QLD88z556	
0	0	0	0	0	0	0	0	QLD88z557	
0	0	0	0	0	0	0	0	QLD88z558	
0	0	0	0	0	0	0	0	QLD88z559	
0	0	0	0	0	0	0	1	QLD88z560	
0	0	0	0	0	0	0	0	QLD88z601	
0	0	0	0	0	0	0	12	QLD88z602	2 Ndic., 12 early instars
0	0	0	0	0	0	0	0	QLD88z603	
0	0	0	0	0	0	0	0	QLD88z604	
0	0	0	0	0	0	0	1	QLD88z605	1 early instars
0	0	0	0	0	0	0	0	QLD88z606	
0	0	0	0	0	0	0	0	QLD88z607	
0	0	0	0	0	0	0	3	QLD88z608	3 unknown

Sph	Az	Utr	lrvHy	adltH	totHyd	Donac	unid moths	cllc	notes
0	0	0	0	0	0	0	0	QLD88z609	
0	0	0	1	1	2	0	0	QLD88z651	3 Ndic.
0	0	0	0	0	0	0	0	QLD88z700	
0	0	0	0	0	0	0	53	QLD88z701	53 early instars
0	0	0	0	0	0	0	3	QLD88z702	3 early instars
0	0	0	0	0	0	0	8	QLD88z703	8 early instars
0	0	0	0	0	0	0	6	QLD88z704	6 early instars
0	0	0	1	0	1	0	0	QLD88z705	2 early instar Nymphula
0	0	0	0	0	0	0	1	QLD88z706	early instar
0	0	0	0	0	0	0	24	QLD88z801	24 early instars
0	0	0	2	0	2	0	0	QLD88z802	
0	0	0	0	0	0	0	0	QLD89z151	
0	0	0	0	0	0	0	0	QLD89z152	
0	0	0	0	0	0	0	0	QLD89z153	
0	0	0	0	0	0	0	0	QLD89z154	
0	0	0	0	0	0	0	1	QLD89z201	
0	0	0	0	0	0	0	0	QLD89z202	
0	0	0	2	0	2	0	0	QLD89z203	
0	0	0	2	0	2	0	0	QLD89z204	
0	0	0	0	0	0	0	0	QLD89z205	
0	0	0	1	0	1	0	0	QLD89z206	
0	0	0	0	0	0	0	0	QLD89z207	
0	0	0	1	0	1	0	0	QLD89z208	
0	0	0	1	0	1	0	0	QLD89z209	
0	0	0	0	0	0	0	0	QLD89z211	
0	0	0	0	0	0	0	0	QLD89z212	
0	0	0	0	0	0	0	0	QLD89z213	
0	0	0	0	0	0	0	0	QLD89z214	
0	0	0	0	0	0	0	0	QLD89z215	
0	0	0	0	0	0	0	1	QLD89z351	
0	0	0	0	0	0	0	0	QLD89z352	
0	0	0	0	0	0	0	0	QLD89z353	
0	0	0	0	0	0	0	0	QLD89z354	
0	0	0	0	0	0	0	1	QLD89z355	
0	0	0	0	0	0	0	0	QLD89z356	
0	0	0	0	0	0	0	0	QLD89z357	
0	0	0	0	0	0	0	0	QLD89z359	
0	0	0	0	0	0	0	0	QLD89z401	
0	0	0	0	0	0	0	0	QLD89z402	
0	0	0	0	0	0	0	0	QLD89z501	
0	0	0	0	0	0	0	0	QLD89z502	
0	0	0	0	0	0	0	0	QLD89z551	
0	0	0	0	0	0	0	3	QLD89z552	
0	0	0	0	0	0	0	0	QLD89z553	
0	0	0	0	0	0	0	0	QLD89z554	
0	0	0	0	0	0	0	0	QLD89z555	
0	0	0	0	0	0	0	0	QLD89z651	
0	0	0	0	0	0	0	1	QLD89z701	
0	0	0	0	0	0	0	9	QLD90z201	

0	0	0	0	0	0	0	5	QLD90z202	3 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z203	13 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z204	
0	0	0	0	0	0	0	0	QLD90z205	
0	0	0	20	0	20	0	0	QLD90z206	1 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z207	
0	0	0	0	0	0	0	0	QLD90z208	5 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z209	
0	0	0	0	0	0	0	0	QLD90z210	
0	0	0	677	4	681	0	0	QLD90z211	3 Parap.
0	0	0	0	0	0	0	0	QLD90z212	17 Parap.
0	0	0	33	16	49	0	0	QLD90z213	
0	0	0	35	0	35	0	0	QLD90z214	1 Parap.
0	0	0	114	2	116	0	0	QLD90z215	53 Parap.
0	0	0	20	0	20	0	0	QLD90z216	4 Parap.
0	0	0	0	0	0	0	0	QLD90z217	4 Parap.
0	0	0	0	0	0	0	0	QLD90z218	3 Parap.
0	0	0	97	0	97	0	0	QLD90z219	8 Parap.
0	0	0	0	0	0	0	37	QLD90z400	
0	0	0	0	0	0	0	0	QLD90z550	2 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z551	13 Parap.sp.,2 Nymph.
0	0	0	0	0	0	0	0	QLD90z552	8 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z553	
0	0	0	0	0	0	0	0	QLD90z600	
0	0	0	0	0	0	0	7	QLD90z700	29 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z701	29 Parap.sp.,15 Nymph.
0	0	0	0	0	0	0	0	QLD90z702	189 Parap.sp.
0	0	0	0	0	0	0	0	QLD90z703	4 Parap.sp.,3 Nymph.
0	0	0	0	0	0	0	0	QLD90z704	5 Parap.sp.,26 Nymph.
0	0	0	0	0	0	0	1	QLD90z705	
0	0	0	0	0	0	0	1	QLD90z706	8 Parap.
0	0	0	0	0	0	0	13	QLD90z707	47 Parap.
0	0	0	0	0	0	0	11	QLD90z708	22 Parap.
0	0	0	0	0	0	0	0	QLD90z709	2 Parap.,4 Nymph.
0	0	0	0	0	0	0	0	QLD90z710	4 Parap.
0	0	0	0	0	0	0	0	QLD90z711	2 Nymph.
0	0	0	8	0	8	0	0	QLD90z712	4 Parap.
0	0	0	0	0	0	0	0	QLD90z713	46 Parap.
0	0	0	0	0	0	0	0	QLD91z201	1 Parap.
0	0	0	0	0	0	0	0	QLD91z202	3 Parap.
0	0	0	390	19	409	0	0	QLD91z203	11 Parap.
0	0	0	24	0	24	0	0	QLD91z204	
0	0	0	0	0	0	0	0	QLD92z201	1 Ephy.
0	0	0	1	0	1	0	0	QLD92z202	1 Parap.
0	0	0	1	0	1	0	0	QLD92z203	5 Parap.(4L,1A)
0	0	0	55	3	58	0	0	QLD92z204	1 Parap.

Appendix K
Database for South Queensland and New South Wales Collections

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
NSW86m201	5-Mar-86	CenP	Centennial Park	Hyd	0.500		0.0	0	0	0	0.0
NSW86m202	5-Mar-86	RBG	Royal Botanical Gar	Hyd	0.300		0.0	0	0	0	0.0
NSW86m203	11-Mar-86	MacR	Macleay River	Hyd	0.500		0.0	0	0	0	0.0
NSW86m204	13-Mar-86	GBC	Grafton Boat Club	Hyd	0.500		0.0	0	0	0	0.0
NSW86m205	13-Mar-86	BBgc	Byron Bay Golf Cour	Hyd	0.500		0.0	0	0	0	0.0
NSW86m651	5-Mar-86	NepR	Nepean River	Egr	0.300		0.0	0	0	0	0.0
NSW86m652	11-Mar-86	MacR	Macleay River	Egr	0.500		0.0	0	0	0	0.0
NSW86m653	11-Mar-86	MacR	Macleay River	Egr	0.500		0.0	0	0	0	0.0
NSW86m655	12-Mar-86	PinC	Pine Creek	Eld	0.500		0.0	0	0	0	0.0
NSW86m656	13-Mar-86	GBC	Grafton Boat Club	Egr	0.500		0.0	0	0	0	0.0
NSW86m801	12-Mar-86	PinC	Pine Creek	Otov	0.500		0.0	0	0	0	0.0
NSW86m802	12-Mar-86	PinC	Pine Creek	Tri	0.500		0.0	0	0	0	0.0
NSW86z201	5-Mar-86	CenP	Centenial Park	Hyd	1.122	0.089	7.9	0	0	0	0.0
NSW86z202	5-Mar-86	RBG	Royal Botanical Gar	Hyd	1.000	0.106	10.6	0	0	0	0.0
NSW86z203	11-Mar-86	MacR	Macleay River	Hyd	0.243	0.019	7.8	0	0	0	0.0
NSW86z204	13-Mar-86	GBC	Grafton Boat Club	Hyd	0.691	0.044	6.4	0	0	0	0.0
NSW86z205	13-Mar-86	BBgc	Byron Bay Golf Cour	Hyd	0.645	0.040	6.2	0	0	0	0.0
NSW86z651	5-Mar-86	NepR	Nepean River	Egr	0.832	0.078	9.4	0	0	0	0.0
NSW86z652	11-Mar-86	MacR	Macleay River	Egr	1.145	0.111	9.7	0	0	0	0.0
NSW86z653	11-Mar-86	MacR	Macleay River	Egr	1.178	0.101	8.6	0	0	0	0.0
NSW86z655	12-Mar-86	PinC	Pine Creek	Eld	1.132	0.119	10.5	0	0	0	0.0
NSW86z656	13-Mar-86	GBC	Grafton Boat Club	Egr	1.185	0.055	4.6	0	0	0	0.0
NSW86z801	12-Mar-86	PinC	Pine Creek	Otov	0.700	0.067	9.6	0	0	0	0.0
NSW86z802	12-Mar-86	PinC	Pine Creek	Tri	1.141	0.121	10.6	0	0	0	0.0
NSW87z150	16-Mar-87	FryS	Fry Street	Egr	1.579	0.109	6.9	0	0	0	0.0
NSW87z151	16-Mar-87	FryS	Fry Street	Egr	0.850	0.052	6.1	0	0	0	0.0
NSW87z152	16-Mar-87	CarC	Carrs Creek	Egr	0.989	0.066	6.7	0	0	0	0.0
NSW87z153	16-Mar-87	GBC	Grafton Boat Club	Egr	1.278	0.091	7.1	0	0	0	0.0
NSW87z154	16-Mar-87	PinC	Pine Creek	Otov	2.371	0.068	2.9	0	0	0	0.0
NSW87z155	26-Apr-87	CarC	Carrs Creek	Egr	1.936	0.137	7.1	0	0	0	0.0
NSW87z156	26-Apr-87	FryS	Fry Street	Egr	1.294	0.090	7.0	0	0	0	0.0
NSW87z157	23-Jun-87	GBC	Grafton Boat Club	Egr	1.750	0.118	6.7	0	0	0	0.0
NSW87z158	20-Jul-87	FryS	Fry Street	Egr	1.724	0.098	5.7	0	0	0	0.0
NSW87z159	20-Jul-87	GBC	Grafton Boat Club	Egr	1.691	0.123	7.3	1	0	1	0.6
NSW87z160	20-Jul-87	CarC	Carrs Creek	Egr	1.240	0.088	7.1	0	0	0	0.0
NSW87z161	31-Aug-87	CarC	Carrs Creek	Egr	1.692	0.131	7.7	0	0	0	0.0
NSW87z162	31-Aug-87	FryS	Fry Street	Egr	1.429	0.124	8.7	0	0	0	0.0
NSW87z163	31-Aug-87	GBC	Grafton Boat Club	Egr	1.374	0.080	5.8	0	0	0	0.0
NSW87z164	15-Oct-87	PinC	Pine Creek	Otov	1.416	0.125	8.8	0	0	0	0.0
NSW87z165	15-Oct-87	PinC	Pine Creek	Eld	0.406	0.168	41.4	0	0	0	0.0
NSW87z166	15-Oct-87	GBC	Grafton Boat Club	Egr	2.151	0.119	5.5	0	0	0	0.0
NSW87z167	15-Oct-87	GBC	Grafton Boat Club	Egr	1.724	0.148	8.6	0	0	0	0.0
NSW87z168	15-Oct-87	FryS	Fry Street	Egr	1.312	0.117	8.9	0	0	0	0.0
NSW87z169	15-Oct-87	CarC	Carrs Creek	Egr	2.023	0.142	7.0	0	0	0	0.0
NSW87z170	7-Dec-87	GBC	Grafton Boat Club	Egr	1.875	0.072	3.8	0	0	0	0.0
NSW87z171	7-Dec-87	CarC	Carrs Creek	Egr	0.948	0.071	7.5	0	0	0	0.0
NSW87z201	16-Mar-87	CarC	Carrs Creek	Hyd	0.198	0.008	4.0	0	0	0	0.0
NSW87z202	17-Mar-87	AlpC	Alipou Creek	Hyd	2.037	0.286	14.0	0	0	0	0.0
NSW87z203	28-Apr-87	AlpC	Alipou Creek	Hyd	1.656	0.112	6.8	0	13	13	7.9
NSW87z204	23-Jun-87	AlpC	Alipou Creek	Hyd	0.714	0.061	8.5	0	0	0	0.0
NSW87z205	20-Jul-87	AlpC	Alipou Creek	Hyd	2.734	0.179	6.5	0	0	0	0.0
NSW87z206	7-Dec-87	AlpC	Alipou Creek	Hyd	1.952	0.158	8.1	0	0	0	0.0
NSW87z207	7-Dec-87	GBC	Grafton Boat Club	Hyd	1.201	0.086	7.2	0	0	0	0.0
NSW87z350	16-Mar-87	CarC	Carrs Creek	Vl?sp	0.121	0.006	5.0	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
NSW87z351	23-Jun-87	GBC	Grafton Boat Club	Vl?sp	1.541	0.063	4.1	0	0	0	0.0
NSW87z352	20-Jul-87	GBC	Grafton Boat Club	Vl?sp	2.679	0.324	12.1	0	0	0	0.0
NSW87z353	31-Aug-87	GBC	Grafton Boat Club	Vl?sp	1.425	0.108	7.6	0	0	0	0.0
NSW87z354	15-Oct-87	GBC	Grafton Boat Club	Vl?sp	1.783	0.244	13.7	0	0	0	0.0
NSW87z355	7-Dec-87	GBC	Grafton Boat Club	Vl?sp	1.368	0.116	8.5	0	0	0	0.0
NSW87z451	15-Oct-87	PinC	Pine Creek	Cab	3.085	0.170	5.5	0	0	0	0.0
NSW87z551	16-Mar-87	FryS	Fry Street	Cer	1.153	0.045	3.9	0	0	0	0.0
NSW87z552	16-Mar-87	CarC	Carrs Creek	Cer	1.221	0.081	6.6	0	0	0	0.0
NSW87z553	26-Apr-87	FryS	Fry Street	Cer	0.424	0.023	5.4	0	0	0	0.0
NSW87z600	26-Apr-87	CarC	Carrs Creek	Naj	1.228	0.067	5.5	0	0	0	0.0
NSW87z601	20-Jul-87	CarC	Carrs Creek	Naj	1.269	0.171	13.5	0	0	0	0.0
NSW87z602	7-Dec-87	CarC	Carrs Creek	Naj	0.702	0.035	5.0	0	0	0	0.0
NSW87z700	31-Aug-87	GBC	Grafton Boat Club	Ndin	0.634	0.034	5.4	0	0	0	0.0
NSW87z701	15-Oct-87	PinC	Pine Creek	Ndin	1.143	0.121	10.6	0	0	0	0.0
NSW87z800	16-Mar-87	PinC	Pine Creek	Tri	1.502	0.183	12.2	0	0	0	0.0
NSW87z801	16-Mar-87	PinC	Pine Creek	Tri	1.757	0.177	10.1	0	0	0	0.0
NSW87z802	23-Jun-87	PinC	Pine Creek	Tri	1.368	0.109	8.0	0	0	0	0.0
NSW87z803	15-Oct-87	PinC	Pine Creek	Tri	1.398	0.168	12.0	0	0	0	0.0
NSW87z804	15-Oct-87	CarC	Carrs Creek	Unk	1.744	0.152	8.7	0	0	0	0.0
NSW88z150	8-Feb-88	GBC	Grafton Boat Club	Egr	1.207	0.073	6.0	0	0	0	0.0
NSW88z151	8-Feb-88	GBC	Grafton Boat Club	Egr	1.257	0.353	28.1	0	0	0	0.0
NSW88z152	9-Feb-88	CarC	Carrs Creek	Egr	0.914	0.057	6.2	1	0	1	1.1
NSW88z153	15-Mar-88	GBC	Grafton Boat Club	Egr	1.628	0.111	6.8	0	0	0	0.0
NSW88z154	15-Mar-88	GBC	Grafton Boat Club	Egr	1.155	0.306	26.5	0	1	1	0.9
NSW88z155	15-Mar-88	CarC	Carrs Creek	Egr	1.544	0.144	9.3	0	0	0	0.0
NSW89z155	10-Oct-89	CarC	Carrs Creek	Egr	1.881	0.132	7.0	0	0	0	0.0
NSW88z156	18-Aug-88	GBC	Grafton Boat Club	Egr	1.476	0.159	10.8	0	0	0	0.0
NSW88z157	18-Aug-88	CarC	Carrs Creek	Egr	1.409	0.101	7.2	0	0	0	0.0
NSW88z158	14-Sep-88	GBC	Grafton Boat Club	Egr	1.499	0.115	7.7	0	0	0	0.0
NSW88z159	14-Sep-88	CarC	Carrs Creek	Egr	1.520	0.096	6.3	0	0	0	0.0
NSW88z160	14-Sep-88	CarC	Carrs Creek	Egr	1.362	0.087	6.4	0	0	0	0.0
NSW88z161	16-Oct-88	GBC	Grafton Boat Club	Egr	1.222	0.085	7.0	0	0	0	0.0
NSW88z162	16-Oct-88	GBC	Grafton Boat Club	Egr	1.367	0.357	26.1	0	0	0	0.0
NSW88z163	16-Oct-88	CarC	Carrs Creek	Egr	1.287	0.091	7.1	0	0	0	0.0
NSW88z164	28-Nov-88	GBC	Grafton Boat Club	Egr	1.682	0.124	7.4	0	0	0	0.0
NSW88z165	28-Nov-88	GBC	Grafton Boat Club	Egr	1.796	0.325	18.1	0	0	0	0.0
NSW88z166	28-Nov-88	CarC	Carrs Creek	Egr	1.447	0.107	7.4	0	0	0	0.0
NSW88z201	8-Feb-88	AlpC	Alipou Creek	Hyd	0.979	0.056	5.7	0	0	0	0.0
NSW88z202	8-Feb-88	GBC	Grafton Boat Club	Hyd	0.383	0.031	8.1	0	0	0	0.0
NSW88z203	8-Feb-88	CarC	Carrs Creek	Hyd	1.225	0.103	8.4	0	0	0	0.0
NSW88z204	15-Mar-88	AlpC	Alipou Creek	Hyd	1.626	0.111	6.8	0	0	0	0.0
NSW88z205	28-Nov-88	AlpC	Alipou Creek	Hyd	1.437	0.160	11.1	0	0	0	0.0
NSW88z206	28-Nov-88	CarC	Carrs Creek	Hyd	1.225	0.129	10.5	0	0	0	0.0
NSW88z350	8-Feb-88	GBC	Grafton Boat Club	Vl?sp	1.439	0.066	4.6	0	0	0	0.0
NSW88z351	14-Sep-88	AlpC	Alipou Creek	Vl?sp	1.420	0.139	9.8	0	41	41	28.9
NSW88z352	16-Oct-88	AlpC	Alipou Creek	Vl?sp	1.356	0.136	10.0	0	6	6	4.4
NSW88z353	28-Nov-88	AlpC	Alipou Creek	Vl?sp	1.938	0.186	9.6	0	0	0	0.0
NSW88z401	18-Aug-88	CarC	Carrs Creek	Ptpr	0.632	0.048	7.6	0	0	0	0.0
NSW88z402	16-Oct-88	AlpC	Alipou Creek	Ptoc	0.871	0.072	8.3	0	0	0	0.0
NSW88z403	16-Oct-88	CarC	Carrs Creek	Ptpr	0.890	0.068	7.6	0	0	0	0.0
NSW88z404	28-Nov-88	AlpC	Alipou Creek	Ptoc	1.887	0.166	8.8	0	0	0	0.0
NSW88z551	15-Mar-88	CarC	Carrs Creek	Cer	0.462	0.024	5.2	0	0	0	0.0
NSW88z600	15-Mar-88	CarC	Carrs Creek	Naj	1.079	0.063	5.8	0	0	0	0.0
NSW89z150	16-Jan-89	GBC	Grafton Boat Club	Egr	1.111	0.083	7.5	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
NSW89z151	16-Jan-89	CarC	Carrs Creek	Egr	1.422	0.111	7.8	0	0	0	0.0
NSW89z152	6-Jun-89	FryS	Fry Street	Egr	1.440	0.168	11.7	0	0	0	0.0
NSW89z153	6-Jun-89	CarC	Carrs Creek	Egr	1.410	0.087	6.2	0	0	0	0.0
NSW89z154	7-Aug-89	FryS	Fry Street	Egr	2.050	0.174	8.5	0	0	0	0.0
NSW89z155	10-Oct-89	CarC	Carrs Creek	Egr	1.881	0.132	7.0	0	0	0	0.0
NSW89z156	4-Dec-89	FryS	Fry Street	Egr			ERROR	0	0	0	ERROR
NSW89z157	4-Dec-89	CarC	Carrs Creek	Egr			ERROR	0	0	0	ERROR
NSW89z201	16-Jan-89	AlpC	Alipou Creek	Hyd	1.956	0.143	7.3	0	0	0	0.0
NSW89z202	16-Jan-89	LSL	Lismore Ski Lake	Hyd	2.084	0.153	7.3	13	49	62	29.8
NSW89z203	6-Jun-89	CarC	Carrs Creek	Hyd	1.749	0.099	5.7	0	0	0	0.0
NSW89z204	6-Jun-89	LSL	Lismore Ski Lake	Hyd	2.608	0.120	4.6	0	0	0	0.0
NSW89z205	7-Aug-89	LSL	Lismore Ski Lake	Hyd	1.302	0.117	9.0	0	0	0	0.0
NSW89z206	4-Dec-89	FryS	Fry Street	Hyd			ERROR	0	0	0	ERROR
NSW89z401	16-Jan-89	AlpC	Alipou Creek	Ptoc	1.142	0.117	10.2	0	0	0	0.0
NSW89z402	4-Dec-89	FryS	Fry Street	Ptcr			ERROR	0	0	0	ERROR
NSW90z101	16-Jan-90	CarC	Carrs Creek	Azo			ERROR	0	0	0	ERROR
NSW90z150	16-Jan-90	CarC	Carrs Creek	Egr			ERROR	0	0	0	ERROR
NSW90z201	20-Mar-90	LSL	Lismore Ski Lake	Hyd			ERROR	0	0	0	ERROR
NSW90z202	20-Mar-90	LSL	Lismore Ski Lake	Hyd			ERROR	0	0	0	ERROR
SQL85m201	12-Dec-85	NR	NO RECORDS	Hyd	0.500		0.0	0	0	0	0.0
SQL85m202	21-Mar-85	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0
SQL85m203	21-Mar-85	RocC	Rockey Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m204	21-Mar-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m205	25-Mar-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m206	26-Mar-85	GLP	Gympie Lions Park	Hyd	0.500		0.0	0	0	0	0.0
SQL85m207	26-Mar-85	Tak	Takilberan Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m208	26-Mar-85	Hor	Horrigan Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m209	12-Jun-85	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m210	12-Jun-85	MarD	Maroon Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m211	8-Jul-85	FMC	Four Mile Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m212	22-Jul-85	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m213	22-Jul-85	CanC	Canungra Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m214	5-Aug-85	ColC	Coles Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m215	5-Aug-85	YabC	Yabba Creek-Imbil	Hyd	0.500		0.0	0	0	0	0.0
SQL85m216	12-Aug-85	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL85m217	12-Aug-85	NPD	North Pine Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m218	19-Aug-85	MRC	Mary River-Conondal	Hyd	0.500		0.0	0	0	0	0.0
SQL85m219	19-Aug-85	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m220	26-Aug-85	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0
SQL85m221	26-Aug-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m222	2-Sep-85	ColF	Colleyville Floodwa	Hyd	0.500		0.0	0	0	0	0.0
SQL85m223	2-Sep-85	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m224	8-Sep-85	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m225	10-Sep-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	1	0	1	2.0
SQL85m226	16-Sep-85	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL85m227	16-Sep-85	NPD	North Pine Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m228	23-Sep-85	CanC	Canungra Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m229	1-Oct-85	MRC	Mary River-Conondal	Hyd	0.500		0.0	0	0	0	0.0
SQL85m230	1-Oct-85	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m231	7-Oct-85	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0
SQL85m232	7-Oct-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m233	14-Oct-85	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m234	14-Oct-85	MarD	Maroon Dam	Hyd	0.500		0.0	100	0	100	200.0
SQL85m235	21-Oct-85	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL85m236	21-Oct-85	CanC	Canungra Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m237	4-Nov-85	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL85m238	18-Nov-85	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m239	18-Nov-85	MRC	Mary River-Conondal	Hyd	0.500		0.0	0	0	0	0.0
SQL85m240	25-Nov-85	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0
SQL85m241	25-Nov-85	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m242	2-Dec-85	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m243	2-Dec-85	MarD	Maroon Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL85m244	12-Dec-85	CanC	Canungra Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m245	12-Dec-85	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m246	16-Dec-85	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL85m247	30-Dec-85	MRC	Mary River-Conondal	Hyd	0.500		0.0	0	0	0	0.0
SQL85m248	30-Dec-85	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL85m401	23-Sep-85	CanC	Canungra Creek	Ptcr	0.500		0.0	0	0	0	0.0
SQL85m402	23-Sep-85	CanC	Canungra Creek	Ptpr	0.500		0.0	0	0	0	0.0
SQL85m403	1-Oct-85	MRC	Mary River-Conondal	Ptpr	0.500		0.0	0	0	0	0.0
SQL85m404	1-Oct-85	CooC	Coonoon Creek	Ptcr	0.500		0.0	0	0	0	0.0
SQL85m405	21-Oct-85	CanC	Canungra Creek	Ptpr	0.500		0.0	0	0	0	0.0
SQL85m406	18-Nov-85	CooC	Coonoon Creek	Ptcr	0.500		0.0	0	0	0	0.0
SQL85m407	2-Dec-85	MarD	Maroon Dam	Ptcr	0.500		0.0	0	0	0	0.0
SQL85m408	12-Dec-85	CanC	Canungra Creek	Ptcr	0.500		0.0	0	0	0	0.0
SQL85m701	4-Nov-85	EnoR	Enoggera Reservoir	Nygi	0.500		0.0	0	0	0	0.0
SQL85m702	18-Nov-85	MRC	Mary River-Conondal	Ndin	0.500		0.0	0	0	0	0.0
SQL85m703	21-Mar-85	EnoR	Enoggera Reservoir	Nymx	0.500		0.0	0	0	0	0.0
SQL85m801	25-Nov-85	QAC	QLD Agricultural Co	Ldpp	0.500		0.0	0	0	0	0.0
SQL85m802	30-Dec-85	MRC	Mary River-Conondal	Ldpp	0.500		0.0	0	0	0	0.0
SQL85z201		NR	No Records	Hyd			ERROR	0	0	0	ERROR
SQL85z202	21-Mar-85	QAC	QLD Agricultural Co	Hyd			ERROR	0	0	0	ERROR
SQL85z203	21-Mar-85	RocC	Rockey Creek	Hyd			ERROR	0	0	0	ERROR
SQL85z204	21-Mar-85	AtkD	Atkinsons Dam	Hyd			ERROR	0	0	0	ERROR
SQL85z205	25-Mar-85	AtkD	Atkinsons Dam	Hyd	1.404		0.0	0	0	0	0.0
SQL85z206	26-Mar-85	GLP	Gympie Lions Park	Hyd			ERROR	0	0	0	ERROR
SQL85z207	26-Mar-85	Tak	Takilberan Creek	Hyd			ERROR	0	0	0	ERROR
SQL85z208	26-Mar-85	Hor	Horrigan Creek	Hyd			ERROR	0	0	0	ERROR
SQL85z209	12-Jun-85	MogD	Moogerah Dam	Hyd	1.492	0.141	9.5	0	0	0	0.0
SQL85z210	12-Jun-85	MarD	Maroon Dam	Hyd	1.512	0.183	12.1	0	0	0	0.0
SQL85z211	8-Jul-85	FMC	Four Mile Creek	Hyd	0.501	0.101	20.2	0	0	0	0.0
SQL85z212	22-Jul-85	CurC	Currumbin Creek	Hyd	1.502	0.103	6.9	0	0	0	0.0
SQL85z213	22-Jul-85	CanC	Canungra Creek	Hyd	1.494	0.130	8.7	0	0	0	0.0
SQL85z214	5-Aug-85	ColC	Coles Creek	Hyd	1.524	0.126	8.3	0	0	0	0.0
SQL85z215	5-Aug-85	YabC	Yabba Creek-Imbil	Hyd	1.546	0.138	8.9	0	0	0	0.0
SQL85z216	12-Aug-85	EnoR	Enoggera Reservoir	Hyd	1.489	0.089	6.0	0	0	0	0.0
SQL85z217	12-Aug-85	NPD	North Pine Dam	Hyd	1.507	0.084	5.6	0	0	0	0.0
SQL85z218	19-Aug-85	MRC	Mary River-Conondal	Hyd	1.565	0.081	5.2	0	0	0	0.0
SQL85z219	19-Aug-85	CooC	Coonoon Creek	Hyd	1.527	0.136	8.9	0	0	0	0.0
SQL85z220	26-Aug-85	QAC	QLD Agricultural Co	Hyd	1.504	0.107	7.1	0	0	0	0.0
SQL85z221	26-Aug-85	AtkD	Atkinsons Dam	Hyd	1.533	0.091	5.9	143	0	143	93.3
SQL85z222	2-Sep-85	ColF	Colleyville Floodwa	Hyd	1.512	0.156	10.3	0	0	0	0.0
SQL85z223	2-Sep-85	MogD	Moogerah Dam	Hyd	1.528	0.124	8.1	0	0	0	0.0
SQL85z224	8-Sep-85	CurC	Currumbin Creek	Hyd	1.498	0.115	7.7	0	0	0	0.0
SQL85z225	10-Sep-85	AtkD	Atkinsons Dam	Hyd	1.533	0.100	6.5	10	0	10	6.5
SQL85z226	16-Sep-85	EnoR	Enoggera Reservoir	Hyd	1.512	0.086	5.7	0	0	0	0.0
SQL85z227	16-Sep-85	NPD	North Pine Dam	Hyd	1.514	0.072	4.8	0	0	0	0.0
SQL85z228	23-Sep-85	CanC	Canungra Creek	Hyd	1.513	0.132	8.7	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL85z229	1-Oct-85	MRC	Mary River-Conondal	Hyd	1.509	0.133	8.8	0	0	0	0.0
SQL85z230	1-Oct-85	CooC	Coonoon Creek	Hyd	1.515	0.111	7.3	0	0	0	0.0
SQL85z231	7-Oct-85	QAC	QLD Agricultural Co	Hyd	1.497	0.114	7.6	0	0	0	0.0
SQL85z232	7-Oct-85	AtkD	Atkinsons Dam	Hyd	1.531	0.156	10.2	0	0	0	0.0
SQL85z233	14-Oct-85	MogD	Moogerah Dam	Hyd	1.532	0.116	7.6	0	0	0	0.0
SQL85z234	14-Oct-85	MarD	Maroon Dam	Hyd	1.499	0.128	8.5	133	252	385	256.8
SQL85z235	21-Oct-85	CurC	Currumbin Creek	Hyd	1.512	0.106	7.0	0	0	0	0.0
SQL85z236	21-Oct-85	CanC	Canungra Creek	Hyd	1.526	0.113	7.4	0	0	0	0.0
SQL85z237	4-Nov-85	EnoR	Enoggera Reservoir	Hyd	1.449	0.091	6.3	0	0	0	0.0
SQL85z238	18-Nov-85	CooC	Coonoon Creek	Hyd	1.515	0.179	11.8	0	0	0	0.0
SQL85z239	18-Nov-85	MRC	Mary River-Conondal	Hyd	1.551	0.110	7.1	0	0	0	0.0
SQL85z240	25-Nov-85	QAC	QLD Agricultural Co	Hyd	1.511	0.146	9.7	0	0	0	0.0
SQL85z241	25-Nov-85	AtkD	Atkinsons Dam	Hyd	1.560	0.112	7.2	0	0	0	0.0
SQL85z242	2-Dec-85	MogD	Moogerah Dam	Hyd	1.513	0.132	8.7	0	0	0	0.0
SQL85z243	2-Dec-85	MarD	Maroon Dam	Hyd	1.546	0.166	10.7	0	3	3	1.9
SQL85z244	12-Dec-85	CanC	Canungra Creek	Hyd	1.497	0.092	6.1	0	0	0	0.0
SQL85z245	12-Dec-85	CurC	Currumbin Creek	Hyd	1.497	0.098	6.5	0	0	0	0.0
SQL85z246	16-Dec-85	EnoR	Enoggera Reservoir	Hyd	1.530	0.117	7.6	0	0	0	0.0
SQL85z247	30-Dec-85	MRC	Mary River-Conondal	Hyd	1.507	0.120	8.0	0	0	0	0.0
SQL85z248	30-Dec-85	CooC	Coonoon Creek	Hyd	1.530	0.093	6.1	0	0	0	0.0
SQL85z401	23-Sep-85	CanC	Canungra Creek	Ptcr	1.502	0.157	10.5	0	0	0	0.0
SQL85z402	23-Sep-85	CanC	Canungra Creek	Ptpr	1.517	0.106	7.0	0	0	0	0.0
SQL85z403	1-Oct-85	MRC	Mary River-Conondal	Ptpr	1.507	0.122	8.1	0	0	0	0.0
SQL85z404	1-Oct-85	CooC	Coonoon Creek	Ptcr	1.505	0.153	10.2	0	0	0	0.0
SQL85z405	21-Oct-85	CanC	Canungra Creek	Ptpr	1.505	0.092	6.1	0	0	0	0.0
SQL85z406	18-Nov-85	CooC	Coonoon Creek	Ptcr	1.545	0.097	6.3	0	0	0	0.0
SQL85z407	2-Dec-85	MarD	Maroon Dam	Ptcr	1.511	0.100	6.6	1	0	1	0.7
SQL85z408	12-Dec-85	CanC	Canungra Creek	Ptcr	1.536	0.092	6.0	0	0	0	0.0
SQL85z701	4-Nov-85	EnoR	Enoggera Reservoir	Nygi	1.518	0.123	8.1	0	0	0	0.0
SQL85z702	18-Nov-85	MRC	Mary River-Conondal	Ndin	1.539	0.161	10.5	0	0	0	0.0
SQL85z703	12-Dec-85	EnoR	Enoggera Reservoir	Nymx	1.533	0.144	9.4	0	0	0	0.0
SQL85z801	25-Nov-85	QAC	QLD Agricultural Co	Ldpp	1.517	0.086	5.7	0	0	0	0.0
SQL85z802	30-Dec-85	MRC	Mary River-Conondal	Ldpp	1.530	0.164	10.7	0	0	0	0.0
SQL86m101	24-Feb-86	BRF	Brisbane River-Fern	Eic	0.500		0.0	0	0	0	0.0
SQL86m102	24-Feb-86	Wac	Wacol	Sal	0.500		0.0	0	0	0	0.0
SQL86m151	5-Mar-86	PetP	Petrie Park	Otov	0.500		0.0	0	0	0	0.0
SQL86m152	7-Apr-86	PetP	Petrie Park	Otov	0.500		0.0	0	0	0	0.0
SQL86m153	28-Apr-86	GolC	Gold Creek	Egr	0.500		0.0	0	0	0	0.0
SQL86m154	13-May-86	PetP	Petrie Park	Otov	0.500		0.0	0	0	0	0.0
SQL86m155	19-May-86	OrmP	Ormiston Park	Egr	0.500		0.0	0	0	0	0.0
SQL86m201	6-Jan-86	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0
SQL86m202	6-Jan-86	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m203	13-Jan-86	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m204	13-Jan-86	MarD	Maroon Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m205	20-Jan-86	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL86m206	20-Jan-86	HDS	Hinze Dam Spillway	Hyd	0.500		0.0	0	0	0	0.0
SQL86m207	3-Feb-86	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL86m208	3-Feb-86	NPD	North Pine Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m209	10-Feb-86	LBor	Lake Borumba	Hyd	0.500		0.0	0	0	0	0.0
SQL86m210	10-Feb-86	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL86m211	17-Feb-86	MogD	Moogerah Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m212	17-Feb-86	MarD	Maroon Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m213	24-Feb-86	SomD	Somerset Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m214	3-Mar-86	QAC	QLD Agricultural Co	Hyd	0.500		0.0	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL86m215	3-Mar-86	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m216	23-Mar-86	CurC	Currumbin Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL86m217	23-Mar-86	HinD	Hinze Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m218	7-Apr-86	EnoR	Enoggera Reservoir	Hyd	0.500		0.0	0	0	0	0.0
SQL86m219	7-Apr-86	PetP	Petrie Park	Hyd	0.500		0.0	0	0	0	0.0
SQL86m220	14-Apr-86	MRC	Mary River-Conondal	Hyd	0.500		0.0	0	0	0	0.0
SQL86m221	14-Apr-86	CooC	Coonoon Creek	Hyd	0.500		0.0	0	0	0	0.0
SQL86m222	21-Apr-86	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m223	21-Apr-86	AtkD	Atkinsons Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m224	21-Apr-86	SomD	Somerset Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m228	13-May-86	PetP	Petrie Park	Hyd	0.500		0.0	0	0	0	0.0
SQL86m229	13-May-86	NPD	North Pine Dam	Hyd	0.500		0.0	0	0	0	0.0
SQL86m350	3-Feb-86	NPD	North Pine Dam	Vl?sp	0.500		0.0	0	0	0	0.0
SQL86m351	14-Apr-86	MRC	Mary River-Conondal	Vl?sp	0.500		0.0	0	0	0	0.0
SQL86m352	21-Apr-86	SomD	Somerset Dam	Vl?sp	0.500		0.0	0	0	0	0.0
SQL86m353	13-May-86	NPD	North Pine Dam	Vlgi	0.500		0.0	0	0	0	0.0
SQL86m401	13-Jan-86	MarD	Maroon Dam	Ptcr	0.500		0.0	0	0	0	0.0
SQL86m402	17-Feb-86	MarD	Maroon Dam	Ptcr	0.500		0.0	0	0	0	0.0
SQL86m403	24-Feb-86	FarC	Fairnie Creek	Ptpc	0.500		0.0	0	0	0	0.0
SQL86m551	3-Feb-86	EnoR	Enoggera Reservoir	Cer	0.500		0.0	0	0	0	0.0
SQL86m700	6-Jan-86	QAC	QLD Agricultural Co	Nygi	0.500		0.0	0	0	0	0.0
SQL86m701	10-Feb-86	LBor	Lake Borumba	Ndin	0.500		0.0	0	0	0	0.0
SQL86m702	7-Apr-86	EnoR	Enoggera Reservoir	Nymx	0.500		0.0	0	0	0	0.0
SQL86z101	24-Feb-86	BRF	Brisbane River-Fern	Eic	1.530	0.098	6.4	0	0	0	0.0
SQL86z102	24-Feb-86	Wac	Wacol	Sal	1.522	0.076	5.0	0	0	0	0.0
SQL86z150	18-Feb-86	ECA	Enoggera Creek-Ashg	Egr	1.517	0.155	10.2	0	0	0	0.0
SQL86z151	5-Mar-86	PetP	Petrie Park	Otov	1.520	0.137	9.0	0	0	0	0.0
SQL86z152	7-Apr-86	PetP	Petrie Park	Otov	1.533	0.095	6.2	0	0	0	0.0
SQL86z153	28-Apr-86	GolC	Gold Creek	Egr	1.214	0.095	7.8	0	0	0	0.0
SQL86z154	13-May-86	PetP	Petrie Park	Otov	0.926	0.072	7.8	0	0	0	0.0
SQL86z155	19-May-86	OrmP	Ormiston Park	Egr	1.310	0.104	7.9	0	0	0	0.0
SQL86z156	27-May-86	ECA	Enoggera Creek-Ashg	Egr	1.055	0.065	6.2	0	0	0	0.0
SQL86z157	27-May-86	EBC	Enoggera-Breakfast	Egr	1.045	0.073	7.0	0	0	0	0.0
SQL86z158	2-Jun-86	GolC	Gold Creek	Egr	1.162	0.068	5.9	0	0	0	0.0
SQL86z159	10-Jun-86	PetP	Petrie Park	Otov	1.129	0.102	9.0	0	0	0	0.0
SQL86z160	7-Jul-86	GolC	Gold Creek	Egr	1.114	0.059	5.3	0	0	0	0.0
SQL86z161	7-Jul-86	ECA	Enoggera Creek-Ashg	Egr	1.143	0.054	4.7	0	0	0	0.0
SQL86z162	7-Jul-86	EBC	Enoggera-Breakfast	Egr	1.080	0.041	3.8	0	0	0	0.0
SQL86z163	14-Jul-86	OrmP	Ormiston Park	Egr	1.404	0.105	7.5	0	0	0	0.0
SQL86z164	19-Jul-86	GolC	Gold Creek	Egr	1.104	0.091	8.2	0	0	0	0.0
SQL86z165	19-Jul-86	ECA	Enoggera Creek-Ashg	Egr	1.091	0.098	9.0	0	0	0	0.0
SQL86z166	19-Jul-86	EBC	Enoggera-Breakfast	Egr	1.193	0.089	7.5	0	0	0	0.0
SQL86z167	19-Jul-86	PetP	Petrie Park	Otov	1.294	0.085	6.6	0	0	0	0.0
SQL86z168	5-Aug-86	OrmP	Ormiston Park	Egr	1.416	0.114	8.1	0	0	0	0.0
SQL86z169	18-Aug-86	GolC	Gold Creek	Egr	1.426	0.105	7.4	0	0	0	0.0
SQL86z170	18-Aug-86	ECA	Enoggera Creek-Ashg	Egr	1.341	0.119	8.9	0	0	0	0.0
SQL86z171	18-Aug-86	EBC	Enoggera-Breakfast	Egr	1.491	0.109	7.3	0	0	0	0.0
SQL86z172	18-Aug-86	OrmP	Ormiston Park	Egr	1.420	0.116	8.2	0	0	0	0.0
SQL86z173	15-Sep-86	GolC	Gold Creek	Egr	1.391	0.105	7.5	0	0	0	0.0
SQL86z174	15-Sep-86	ECA	Enoggera Creek-Ashg	Egr	1.298	0.098	7.6	0	0	0	0.0
SQL86z175	15-Sep-86	EBC	Enoggera-Breakfast	Egr	1.190	0.086	7.2	0	0	0	0.0
SQL86z176	15-Sep-86	OrmP	Ormiston Park	Egr	1.295	0.094	7.3	0	0	0	0.0
SQL86z177	16-Oct-86	OrmC	Ormiston Creek	Otov	0.900	0.050	5.6	0	0	0	0.0
SQl86z178	16-Oct-86	OrmP	Ormiston Park	Egr	1.235	0.067	5.4	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL86z179	21-Oct-86	GolC	Gold Creek	Egr	1.288	0.092	7.1	0	0	0	0.0
SQL86z180	21-Oct-86	ECA	Enoggera Creek-Ashg	Egr	1.242	0.091	7.3	0	0	0	0.0
SQL86z181	21-Oct-86	EBC	Enoggera-Breakfast	Egr	1.370	0.074	5.4	0	0	0	0.0
SQL86z182	17-Nov-86	GolC	Gold Creek	Egr	1.183	0.092	7.8	0	0	0	0.0
SQL86z183	17-Nov-86	ECA	Enoggera Creek-Ashg	Egr	1.349	0.077	5.7	0	0	0	0.0
SQL86z184	17-Nov-86	EBC	Enoggera-Breakfast	Egr	1.469	0.075	5.1	0	0	0	0.0
SQL86z185	17-Nov-86	OrmP	Ormiston Park	Otov	1.866	0.135	7.2	0	0	0	0.0
SQL86z186	17-Nov-86	OrmP	Ormiston Park	Egr	1.063	0.071	6.7	0	0	0	0.0
SQL86z201	6-Jan-86	QAC	QLD Agricultural Co	Hyd	1.512	0.117	7.7	0	0	0	0.0
SQL86z202	6-Jan-86	AtkD	Atkinsons Dam	Hyd	1.526	0.142	9.3	0	0	0	0.0
SQL86z203	13-Jan-86	MogD	Moogerah Dam	Hyd	1.513	0.135	8.9	0	0	0	0.0
SQL86z204	13-Jan-86	MarD	Maroon Dam	Hyd	1.516	0.172	11.3	0	0	0	0.0
SQL86z205	20-Jan-86	CurC	Currumbin Creek	Hyd	1.544	0.118	7.6	0	0	0	0.0
SQL86z206	20-Jan-86	HDS	Hinze Dam Spillway	Hyd	1.533	0.155	10.1	0	0	0	0.0
SQL86z207	3-Feb-86	EnoR	Enoggera Reservoir	Hyd	1.528	0.141	9.2	0	0	0	0.0
SQL86z208	3-Feb-86	NPD	North Pine Dam	Hyd	1.547	0.145	9.4	0	0	0	0.0
SQL86z209	10-Feb-86	LBor	Lake Borumba	Hyd	1.506	0.164	10.9	0	0	0	0.0
SQL86z210	10-Feb-86	CooC	Coonoon Creek	Hyd	1.499	0.158	10.5	0	0	0	0.0
SQL86z211	17-Feb-86	MogD	Moogerah Dam	Hyd	1.532	0.194	12.7	0	0	0	0.0
SQL86z212	17-Feb-86	MarD	Maroon Dam	Hyd	1.536	0.140	9.1	0	5	5	3.3
SQL86z213	24-Feb-86	SomD	Somerset Dam	Hyd	1.550	0.092	5.9	0	0	0	0.0
SQL86z214	3-Mar-86	QAC	QLD Agricultural Co	Hyd	1.534	0.100	6.5	0	0	0	0.0
SQL86z215	3-Mar-86	AtkD	Atkinsons Dam	Hyd	1.512	0.132	8.7	0	0	0	0.0
SQL86z216	23-Mar-86	CurC	Currumbin Creek	Hyd	1.536	0.115	7.5	0	0	0	0.0
SQL86z217	23-Mar-86	HinD	Hinze Dam	Hyd	1.527	0.135	8.8	0	0	0	0.0
SQL86z218	7-Apr-86	EnoR	Enoggera Reservoir	Hyd	1.511	0.084	5.6	0	0	0	0.0
SQL86z219	7-Apr-86	PetP	Petrie Park	Hyd	1.539	0.102	6.6	0	0	0	0.0
SQL86z220	14-Apr-86	MRC	Mary River-Conondal	Hyd	1.523	0.119	7.8	0	0	0	0.0
SQL86z221	14-Apr-86	CooC	Coonoon Creek	Hyd	1.503	0.136	9.0	0	0	0	0.0
SQL86z222	21-Apr-86	AtkD	Atkinsons Dam	Hyd	1.501	0.111	7.4	0	0	0	0.0
SQL86z223	21-Apr-86	AtkD	Atkinsons Dam	Hyd	1.500	0.092	6.1	14	13	27	18.0
SQL86z224	21-Apr-86	SomD	Somerset Dam	Hyd	1.531	0.089	5.8	0	0	0	0.0
SQL86z225	28-Apr-86	MogD	Moogerah Dam	Hyd	1.542	0.112	7.3	0	3	3	1.9
SQL86z226	6-May-86	HinD	Hinze Dam	Hyd	1.529	0.147	9.6	2	3	5	3.3
SQL86z227	6-May-86	CanC	Canungra Creek	Hyd	1.511	0.103	6.8	0	0	0	0.0
SQL86z228	13-May-86	PetP	Petrie Park	Hyd	1.542	0.102	6.6	0	0	0	0.0
SQL86z229	13-May-86	NPD	North Pine Dam	Hyd	1.535	0.093	6.1	0	0	0	0.0
SQL86z230	26-May-86	LBor	Lake Borumba	Hyd	1.542	0.134	8.7	1	1	2	1.3
SQL86z231	26-May-86	MRC	Mary River-Conondal	Hyd	1.502	0.108	7.2	0	0	0	0.0
SQL86z232	2-Jun-86	SomD	Somerset Dam	Hyd	1.329	0.109	8.2	0	0	0	0.0
SQL86z233	10-Jun-86	PetP	Petrie Park	Hyd	1.563	0.090	5.8	0	0	0	0.0
SQL86z234	10-Jun-86	NPD	North Pine Dam	Hyd	1.568	0.099	6.3	0	0	0	0.0
SQL86z235	16-Jun-86	LBor	Lake Borumba	Hyd	1.511	0.119	7.9	0	0	0	0.0
SQL86z236	16-Jun-86	MRC	Mary River-Conondal	Hyd	1.504	0.115	7.6	0	0	0	0.0
SQL86z237	30-Jun-86	LBor	Lake Borumba	Hyd	1.511	0.122	8.1	0	0	0	0.0
SQL86z238	30-Jun-86	MRC	Mary River-Conondal	Hyd	1.543	0.142	9.2	0	0	0	0.0
SQL86z239	7-Jul-86	SomD	Somerset Dam	Hyd	1.512	0.064	4.2	0	0	0	0.0
SQL86z240	14-Jul-86	NPD	North Pine Dam	Hyd	1.494	0.125	8.4	0	0	0	0.0
SQL86z241	28-Jul-86	LBor	Lake Borumba	Hyd	1.540	0.101	6.6	4	39	43	27.9
SQL86z242	29-Jul-86	MogD	Moogerah Dam	Hyd	1.419	0.161	11.3	124	14	138	97.3
SQL86z243	29-Jul-86	MogD	Moogerah Dam	Hyd	2.400	0.255	10.6	44	126	170	70.8
SQL86z244	4-Aug-86	SomD	Somerset Dam	Hyd	1.491	0.105	7.0	0	0	0	0.0
SQL86z245	25-Aug-86	MRC	Mary River-Conondal	Hyd	1.486	0.108	7.3	0	0	0	0.0
SQL86z246	25-Aug-86	LBor	Lake Borumba	Hyd	1.449	0.135	9.3	14	1	15	10.4

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW 1	total HSB	kg HSBW
SQL86z247	6-Oct-86	MRC	Mary River-Conondal	Hyd	1.485	0.147	9.9	1	0	1	0.7
SQL86z248	6-Oct-86	LBor	Lake Borumba	Hyd	1.105	0.079	7.1	2	40	42	38.0
SQL86z249	13-Oct-86	SomD	Somerset Dam	Hyd	0.841	0.046	5.5	6	25	31	36.9
SQL86z250	27-Oct-86	MRC	Mary River-Conondal	Hyd	1.979	0.090	4.5	0	0	0	0.0
SQL86z251	27-Oct-86	LBor	Lake Borumba	Hyd	1.297	0.145	11.2	0	0	0	0.0
SQL86z252	3-Nov-86	SomD	Somerset Dam	Hyd	1.893	0.171	9.0	17	173	190	100.4
SQL86z253	10-Nov-86	MRC	Mary River-Conondal	Hyd	1.849	0.289	15.6	0	0	0	0.0
SQL86z254	10-Nov-86	LBor	Lake Borumba	Hyd	1.471	0.099	6.7	0	3	3	2.0
SQL86z255	24-Nov-86	SomD	Somerset Dam	Hyd	1.188	0.148	12.5	0	5	5	4.2
SQL86z256	24-Nov-86	SomD	Somerset Dam	Hyd	1.432	0.158	11.0	28	53	81	56.6
SQL86z257	1-Dec-86	NPD	North Pine Dam	Hyd	1.098	0.077	7.0	74	177	251	228.6
SQL86z258	8-Dec-86	NPD	North Pine Dam	Hyd	0.889	0.059	6.6	0	12	12	13.5
SQL86z259	8-Dec-86	MRC	Mary River-Conondal	Hyd	1.167	0.082	7.0	0	0	0	0.0
SQL86z260	8-Dec-86	LBor	Lake Borumba	Hyd	1.233	0.149	12.1	0	3	3	2.4
SQL86z350	3-Feb-86	NPD	North Pine Dam	Vl?sp	1.496	0.137	9.2	0	0	0	0.0
SQL86z351	14-Apr-86	MRC	Mary River-Conondal	Vl?sp	1.518	0.117	7.7	0	0	0	0.0
SQL86z352	21-Apr-86	SomD	Somerset Dam	Vl?sp	1.531	0.155	10.1	0	0	0	0.0
SQL86z353	13-May-86	NPD	North Pine Dam	Vlgi	1.535	0.099	6.4	0	0	0	0.0
SQL86z354	26-May-86	LBor	Lake Borumba	Vl?sp	1.537	0.126	8.2	0	65	65	42.3
SQL86z355	26-May-86	MRC	Mary River-Conondal	Vl?sp	1.534	0.136	8.9	0	0	0	0.0
SQL86z356	2-Jun-86	SomD	Somerset Dam	Vl?sp	1.011	0.117	11.6	0	0	0	0.0
SQL86z357	10-Jun-86	NPD	North Pine Dam	Vlgi	1.069	0.083	7.8	0	0	0	0.0
SQL86z358	10-Jun-86	NPD	North Pine Dam	Vl?sp	1.126	0.059	5.2	0	0	0	0.0
SQL86z359	16-Jun-86	LBor	Lake Borumba	Vl?sp	1.181	0.049	4.1	0	0	0	0.0
SQL86z360	16-Jun-86	MRC	Mary River-Conondal	Vl?sp	1.545	0.141	9.1	0	0	0	0.0
SQL86z361	30-Jun-86	LBor	Lake Borumba	Vl?sp	1.545	0.111	7.2	0	0	0	0.0
SQL86z362	30-Jun-86	MRC	Mary River-Conondal	Vl?sp	1.481	0.109	7.4	0	0	0	0.0
SQL86z363	7-Jul-86	SomD	Somerset Dam	Vl?sp	1.111	0.064	5.8	0	0	0	0.0
SQL86z364	14-Jul-86	NPD	North Pine Dam	Vlgi	1.102	0.096	8.7	0	0	0	0.0
SQL86z365	14-Jul-86	NPD	North Pine Dam	Vl?sp	1.102	0.070	6.4	0	0	0	0.0
SQL86z366	28-Jul-86	LBor	Lake Borumba	Vl?sp	1.572	0.095	6.0	0	15	15	9.5
SQL86z367	28-Jul-86	MRC	Mary River-Conondal	Vl?sp	1.200	0.085	7.1	0	0	0	0.0
SQL86z368	4-Aug-86	SomD	Somerset Dam	Vl?sp	1.251	0.101	8.1	0	0	0	0.0
SQL86z369	25-Aug-86	NPD	North Pine Dam	Vl?sp	1.496	0.141	9.4	0	14	14	9.4
SQL86z370	25-Aug-86	MRC	Mary River-Conondal	Vl?sp	1.442	0.139	9.6	0	0	0	0.0
SQL86z371	25-Aug-86	YabC	Yabba Creek-Imbil	Vl?sp	1.145	0.091	7.9	0	0	0	0.0
SQL86z372	25-Aug-86	LBor	Lake Borumba	Vl?sp	1.398	0.125	8.9	94	5	99	70.9
SQL86z373	15-Sep-86	SomD	Somerset Dam	Vl?sp	1.390	0.115	8.3	1	6	7	5.0
SQL86z374	6-Oct-86	MRC	Mary River-Conondal	Vl?sp	1.785	0.209	11.7	0	0	0	0.0
SQL86z375	6-Oct-86	YabC	Yabba Creek-Imbil	Vl?sp	1.325	0.108	8.2	.0	0	0	0:0
SQL86z376	6-Oct-86	LBor	Lake Borumba	Vl?sp	1.295	0.111	8.6	1	844	845	652.5
SQL86z377	13-Oct-86	SomD	Somerset Dam	Vl?sp	1.152	0.071	6.2	3	51	54	46.9
SQL86z378	27-Oct-86	MRC	Mary River-Conondal	Vl?sp	1.781	0.184	10.3	0	0	0	0.0
SQL86z379	27-Oct-86	YabC	Yabba Creek-Imbil	Vl?sp	1.486	0.225	15.1	0	0	0	0.0
SQL86z380	27-Oct-86	LBor	Lake Borumba	Vl?sp	1.198	0.117	9.8	0	37	37	30.9
SQL86z381	3-Nov-86	SomD	Somerset Dam	Vl?sp	1.475	0.102	6.9	0	10	10	6.8
SQL86z382	10-Nov-86	MRC	Mary River-Conondal	Vl?sp	1.509	0.076	5.0	0	0	0	0.0
SQL86z383	10-Nov-86	YabC	Yabba Creek-Imbil	Vl?sp	1.405	0.181	12.9	0	0	0	0.0
SQL86z384	10-Nov-86	LBor	Lake Borumba	Vl?sp	1.410	0.093	6.6	0	15	15	10.6
SQL86z385	24-Nov-86	SomD	Somerset Dam	Vl?sp	0.862	0.063	7.3	0	5	5	5.8
SQL86z386	8-Dec-86	MRC	Mary River-Conondal	Vl?sp	1.244	0.169	13.6	0	0	0	0.0
SQL86z387	8-Dec-86	YabC	Yabba Creek-Imbil	Vl?sp	1.497	0.191	12.8	0	0	0	0.0
SQL86z388	8-Dec-86	LBor	Lake Borumba	Vl?sp	1.181	0.092	7.8	0	0	0	0.0
SQL86z401	13-Jan-86	MarD	Maroon Dam	Ptcr	1.517	0.148	9.8	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW 1	total HSB	kg HSBW
SQL86z402	17-Feb-86	MarD	Maroon Dam	Ptcr	1.516	0.141	9.3	0	0	0	0.0
SQL86z403	24-Feb-86	FarC	Fairnie Creek	Ptpc	1.527	0.174	11.4	0	0	0	0.0
SQL86z404	6-May-86	CanC	Canungra Creek	Ptpr	1.499	0.099	6.6	0	0	0	0.0
SQL86z405	25-Aug-86	LBor	Lake Borumba	Ptpr	1.360	0.114	8.4	0	0	0	0.0
SQL86z406	8-Dec-86	LBor	Lake Borumba	Ptcr	0.557	0.046	8.3	0	0	0	0.0
SQL86z407	8-Dec-86	LBor	Lake Borumba	Pttr	0.496	0.057	11.5	0	0	0	0.0
SQL86z451	10-Jun-86	FMC	Four Mile Creek	Cab	1.012	0.061	6.0	0	0	0	0.0
SQL86z452	28-Jul-86	MRC	Mary River-Conondal	Cab	0.906	0.055	6.1	0	0	0	0.0
SQL86z501	25-Aug-86	MRC	Mary River-Conondal	Myvr	1.265	0.091	7.2	0	0	0	0.0
SQL86z502	8-Dec-86	LBor	Lake Borumba	Myvr	0.267	0.022	8.2	0	0	0	0.0
SQL86z551	3-Feb-86	EnoR	Enoggera Reservoir	Cer	1.509	0.139	9.2	0	0	0	0.0
SQL86z552	4-Aug-86	SomD	Somerset Dam	Cer	1.038	0.079	7.6	0	0	0	0.0
SQL86z553	15-Sep-86	SomD	Somerset Dam	Cer	1.150	0.089	7.7	0	0	0	0.0
SQL86z600	2-Jun-86	SomD	Somerset Dam	Naj	1.162	0.068	5.9	0	0	0	0.0
SQL86z601	16-Jun-86	LBor	Lake Borumba	Naj	1.144	0.062	5.4	0	0	0	0.0
SQL86z602	10-Nov-86	LBor	Lake Borumba	Naj	1.474	0.175	11.9	0	0	0	0.0
SQL86z603	8-Dec-86	LBor	Lake Borumba	Naj	1.301	0.122	9.4	0	0	0	0.0
SQL86z700	6-Jan-86	QAC	QLD Agricultural Co	Nygi	1.521	0.145	9.5	0	0	0	0.0
SQL86z701	10-Feb-86	LBor	Lake Borumba	Ndin	1.536	0.179	11.7	0	0	0	0.0
SQL86z702	7-Apr-86	EnoR	Enoggera Reservoir	Nymx	1.522	0.123	8.1	0	0	0	0.0
SQL86z703	25-Aug-86	NPD	North Pine Dam	Ndin	1.118	0.155	13.9	0	0	0	0.0
SQL86z704	8-Dec-86	LBor	Lake Borumba	Ndin	1.079	0.119	11.0	0	0	0	0.0
SQL86z800	4-Aug-86	NorG	Normanby Gully	Mar	0.319	0.032	10.0	0	0	0	0.0
SQL87z150	7-Jan-87	RGR	Rafting Ground Road	Egr	1.433	0.124	8.7	0	0	0	0.0
SQL87z151	7-Jan-87	ECA	Enoggera Creek-Ashg	Egr	1.421	0.085	6.0	0	0	0	0.0
SQL87z152	7-Jan-87	EBC	Enoggera-Breakfast	Egr	1.567	0.096	6.1	0	0	0	0.0
SQL87z153	7-Jan-87	OrmC	Ormiston Creek	Otov	1.584	0.155	9.8	0	0	0	0.0
SQL87z154	7-Jan-87	OrmP	Ormiston Park	Egr	0.863	0.063	7.3	0	0	0	0.0
SQL87Z155	2-Feb-87	GolC	Gold Creek	Egr	1.499	0.100	6.7	0	0	0	0.0
SQL87z156	2-Feb-87	ECA	Enoggera Creek-Ashg	Egr	1.223	0.074	6.1	0	0	0	0.0
SQL87z157	2-Feb-87	EBC	Enoggera-Breakfast	Egr	1.083	0.056	5.2	0	0	0	0.0
SQL87z158	2-Feb-87	OrmC	Ormiston Creek	Otov	1.037	0.093	9.0	0	0	0	0.0
SQL87z159	2-Feb-87	OrmP	Ormiston Park	Egr	1.050	0.100	9.5	0	0	0	0.0
SQL87z160	2-Mar-87	GolC	Gold Creek	Egr	1.505	0.109	7.2	0	0	0	0.0
SQL87z161	2-Mar-87	ECA	Enoggera Creek-Ashg	Egr	1.671	0.099	5.9	0	0	0	0.0
SQL87z162	2-Mar-87	OrmP	Ormiston Park	Egr	1.202	0.103	8.6	0	0	0	0.0
SQL87z163	21-May-87	GolC	Gold Creek	Egr	1.439	0.103	7.2	0	0	0	0.0
SQL87z164	21-May-87	ECA	Enoggera Creek-Ashg	Egr	1.359	0.098	7.2	0	0	0	0.0
SQL87z165	21-May-87	OrmP	Ormiston Park	Egr	1.452	0.111	7.6	0	0	0	0.0
SQL87z166	6-Jul-87	OrmP	Ormiston Park	Egr	0.769	0.048	6.2	0	0	0	0.0
SQL87z167	6-Jul-87	ECA	Enoggera Creek-Ashg	Egr	1.103	0.068	6.2	0	0	0	0.0
SQL87z168	26-Oct-87	ECA	Enoggera Creek-Ashg	Egr	1.066	0.056	5.3	0	0	0	0.0
SQL87z169	7-Dec-87	OrmP	Ormiston Park	Egr	0.929	0.064	6.9	0	0	0	0.0
SQL87z170	15-Dec-87	ECA	Enoggera Creek-Ashg	Egr	0.948	0.071	7.5	0	0	0	0.0
SQL87z171	15-Dec-87	GolC	Gold Creek	Egr	1.116	0.121	10.8	0	0	0	0.0
SQL87z201	19-Jan-87	SomD	Somerset Dam	Hyd	1.367	0.142	10.4	0	0	0	0.0
SQL87z202	19-Jan-87	SomD	Somerset Dam	Hyd	1.395	0.418	30.0	20	0	20	14.[illegible]
SQL87z203	27-Jan-87	YabC	Yabba Creek-Imbil	Hyd	1.432	0.091	6.4	0	0	0	0.0
SQL87z204	27-Jan-87	LBor	Lake Borumba	Hyd	1.230	0.244	19.8	0	0	0	0.0
SQL87z205	27-Jan-87	LBor	Lake Borumba	Hyd	1.276	0.129	10.1	68	0	68	53.3
SQL87z206	27-Jan-87	MRC	Mary River-Conondal	Hyd	0.962	0.098	10.2	0	0	0	0.0
SQL87z207	2-Feb-87	NPD	North Pine Dam	Hyd	1.861	0.245	13.2	1	0	1	0.5
SQL87z208	2-Feb-87	NPD	North Pine Dam	Hyd	1.271	0.407	32.0	56	65	121	95.2
SQL87z209	10-Feb-87	SomD	Somerset Dam	Hyd	1.138	0.096	8.4	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW i	total HSB	kg HSBW
SQL87z210	10-Feb-87	SomD	Somerset Dam	Hyd	2.006	0.705	35.1	108	221	329	164.0
SQL87z211	23-Feb-87	YabC	Yabba Creek-Imbil	Hyd	1.065	0.079	7.4	0	0	0	0.0
SQL87z212	23-Feb-87	LBor	Lake Borumba	Hyd	1.154	0.153	13.3	0	0	0	0.0
SQL87z213	23-Feb-87	LBor	Lake Borumba	Hyd	1.173	0.153	13.0	11	61	72	61.4
SQL87z214	23-Feb-87	MRC	Mary River-Conondal	Hyd	1.068	0.086	8.1	0	0	0	0.0
SQL87z215	2-Mar-87	NPD	North Pine Dam	Hyd	1.624	0.187	11.5	0	0	0	0.0
SQL87z216	2-Mar-87	NPD	North Pine Dam	Hyd	1.899	0.545	28.7	4	50	54	26.4
SQL87z217	9-Mar-87	SomD	Somerset Dam	Hyd	1.492	0.147	9.9	13	79	92	61.7
SQL87z218	9-Mar-87	SomD	Somerset Dam	Hyd	2.085	0.712	34.1	194	49	243	[illegible]
SQL87z219	24-Mar-87	NPD	North Pine Dam	Hyd	1.139	0.089	7.8	0	0	0	0.0
SQL87z220	24-Mar-87	NPD	North Pine Dam	Hyd	1.579	0.414	26.2	33	0	33	20.9
SQL87z221	5-May-87	YabC	Yabba Creek-Imbil	Hyd	1.246	0.106	8.5	0	0	0	0.0
SQL87z222	5-May-87	LBor	Lake Borumba	Hyd	1.463	0.140	9.6	0	0	0	0.0
SQL87z223	12-May-87	SomD	Somerset Dam	Hyd	1.504	0.143	9.5	1	0	1	0.7
SQL87z224	2-Jun-87	NPD	North Pine Dam	Hyd	1.538	0.148	9.6	1	2	3	2.0
SQL87z225	2-Jun-87	MogD	Moogerah Dam	Hyd	1.841	0.189	10.3	6	16	22	12.0
SQL87z226	2-Jun-87	MarD	Maroon Dam	Hyd	1.493	0.074	5.0	0	0	0	0.0
SQL87z227	30-Jun-87	CooC	Coonoon Creek	Hyd	0.990	0.076	7.7	0	0	0	0.0
SQL87z228	30-Jun-87	YabC	Yabba Creek-Imbil	Hyd	0.729	0.046	6.3	0	0	0	0.0
SQL87z229	30-Jun-87	LBor	Lake Borumba	Hyd	1.150	0.095	8.3	1	0	1	0.9
SQL87z230	6-Jul-87	NPD	North Pine Dam	Hyd	0.968	0.099	10.2	0	0	0	0.0
SQL87z231	13-Jul-87	MarD	Maroon Dam	Hyd	1.483	0.111	7.5	0	0	0	0.0
SQL87z232	13-Jul-87	MogD	Moogerah Dam	Hyd	1.508	0.181	12.0	0	0	0	0.0
SQL87z233	13-Jul-87	MogD	Moogerah Dam	Hyd	2.002	0.247	12.3	0	0	0	0.0
SQL87z234	13-Jul-87	SomD	Somerset Dam	Hyd	1.481	0.164	11.1	0	0	0	0.0
SQL87z235	3-Aug-87	NPD	North Pine Dam	Hyd	1.207	0.103	8.5	6	12	18	14.9
SQL87z236	11-Aug-87	CooC	Coonoon Creek	Hyd	1.146	0.077	6.7	0	0	0	0.0
SQL87z237	11-Aug-87	LBor	Lake Borumba	Hyd	1.939	0.173	8.9	1	6	7	3.6
SQL87z238	18-Aug-87	SomD	Somerset Dam	Hyd	1.108	0.101	9.1	0	3	3	2.7
SQL87z239	18-Aug-87	MogD	Moogerah Dam	Hyd	1.606	0.146	9.1	4	181	185	115.2
SQL87z240	22-Sep-87	YabN	Yabba Creek North	Hyd	1.626	0.119	7.3	0	0	0	0.0
SQL87z241	22-Sep-87	LBor	Lake Borumba	Hyd	1.976	0.116	5.9	0	0	0	0.0
SQL87z242	22-Sep-87	CooC	Coonoon Creek	Hyd	1.609	0.113	7.0	0	0	0	0.0
SQL87z243	29-Sep-87	SomD	Somerset Dam	Hyd	1.537	0.202	13.1	0	2	2	1.3
SQL87z244	29-Sep-87	MogD	Moogerah Dam	Hyd	1.938	0.126	6.5	11	450	461	237.9
SQL87z245	26-Oct-87	NPD	North Pine Dam	Hyd	1.676	0.182	10.9	18	100	118	70.4
SQL87z246	26-Oct-87	NPD	North Pine Dam	Hyd	1.638	0.106	6.5	13	33	46	28.1
SQL87z247	2-Nov-87	NPD	North Pine Dam	Hyd	1.507	0.113	7.5	17	83	100	66.4
SQL87z248	2-Nov-87	NPD	North Pine Dam	Hyd	1.482	0.122	8.2	9	99	108	72.9
SQL87z249	2-Nov-87	NPD	North Pine Dam	Hyd	1.559	0.125	8.0	15	102	117	75.0
SQL87z250	18-Nov-87	ColC	Coles Creek	Hyd	1.908	0.115	6.0	0	0	0	0.0
SQL87z251	18-Nov-87	MRN	Mary River North	Hyd	1.099	0.071	6.5	0	0	0	0.0
SQL87z252	18-Nov-87	YabC	Yabba Creek-Imbil	Hyd	1.288	0.094	7.3	0	0	0	0.0
SQL87z253	30-Nov-87	SomD	Somerset Dam	Hyd	1.692	0.089	5.3	3	134	137	81.0
SQL87z254	30-Nov-87	MogD	Moogerah Dam	Hyd	1.312	0.161	12.3	0	1	1	0.8
SQL87z255	30-Nov-87	MogD	Moogerah Dam	Hyd	1.376	0.542	39.4	0	0	0	0.0
SQL87z256	15-Dec-87	NPD	North Pine Dam	Hyd	1.236	0.123	10.0	86	700	786	635.9
SQL87z257	15-Dec-87	MRN	Mary River North	Hyd	0.830	0.059	7.1	3	2	5	6.0
SQL87z258	15-Dec-87	YabC	Yabba Creek-Imbil	Hyd	1.806	0.071	3.9	0	0	0	0.0
SQL87z259	15-Dec-87	MRC	Mary River-Conondal	Hyd	0.830	0.059	7.1	0	0	0	0.0
SQL87z350	19-Jan-87	SomD	Somerset Dam	Vl?sp	1.194	0.122	10.2	0	0	0	0.0
SQL87z351	27-Jan-87	YabC	Yabba Creek-Imbil	Vl?sp	1.134	0.156	13.8	0	0	0	0.0
SQL87z352	27-Jan-87	LBor	Lake Borumba	Vl?sp	1.008	0.093	9.2	0	0	0	0.0
SQL87z353	27-Jan-87	MRC	Mary River-Conondal	Vl?sp	1.579	0.158	10.0	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL87z354	10-Feb-87	SomD	Somerset Dam	Vl?sp	1.211	0.103	8.5	7	48	55	45.4
SQL87z355	23-Feb-87	YabC	Yabba Creek-Imbil	Vl?sp	1.033	0.098	9.5	0	0	0	0.0
SQL87z356	23-Feb-87	LBor	Lake Borumba	Vl?sp	1.257	0.112	8.9	0	0	0	0.0
SQL87z357	23-Feb-87	MRC	Mary River-Conondal	Vl?sp	1.641	0.157	9.6	0	0	0	0.0
SQL87z358	9-Mar-87	SomD	Somerset Dam	Vl?sp	1.986	0.221	11.1	0	13	13	6.5
SQL87z359	24-Mar-87	NPD	North Pine Dam	Vl?sp	1.489	0.142	9.5	0	0	0	0.0
SQL87z360	5-May-87	YabC	Yabba Creek-Imbil	Vl?sp	1.373	0.109	7.9	0	0	0	0.0
SQL87z361	5-May-87	LBor	Lake Borumba	Vl?sp	1.912	0.223	11.7	2	40	42	[illegible]
SQL87z362	2-Jun-87	NPD	North Pine Dam	Vl?sp	1.635	0.242	14.8	1	4	5	[illegible]
SQL87z363	30-Jun-87	YabC	Yabba Creek-Imbil	Vl?sp	1.182	0.157	13.3	0	0	0	0.0
SQL87z364	6-Jul-87	NPD	North Pine Dam	Vl?sp	0.990	0.108	10.9	0	0	0	0.0
SQL87z365	13-Jul-87	SomD	Somerset Dam	Vl?sp	1.808	0.245	13.6	0	0	0	0.0
SQL87z366	11-Aug-87	YabC	Yabba Creek-Imbil	Vl?sp	1.576	0.176	11.2	0	2	2	[illegible]
SQL87z367	11-Aug-87	LBor	Lake Borumba	Vl?sp	0.508	0.048	9.4	0	5	5	9.8
SQL87z368	18-Aug-87	SomD	Somerset Dam	Vl?sp	1.752	0.131	7.5	20	140	160	[illegible]
SQL87z369	22-Sep-87	YabN	Yabba Creek North	Vl?sp	1.626	0.177	10.9	0	0	0	0.0
SQL87z370	29-Sep-87	BRC	Brisbane River-Coll	Vl?sp	1.947	0.173	8.9	0	0	0	0.0
SQL87z371	18-Nov-87	YabC	Yabba Creek-Imbil	Vl?sp	0.773	0.089	11.5	0	0	0	0.0
SQL87z372	15-Dec-87	YabC	Yabba Creek-Imbil	Vl?sp	1.297	0.191	14.7	1	3	4	[illegible]
SQL87z401	27-Jan-87	LBor	Lake Borumba	Pttr	0.472	0.048	10.2	0	0	[illegible]	0.0
SQL87z402	23-Feb-87	YabC	Yabba Creek-Imbil	Ptpr	0.633	0.068	10.7	0	1	1	[illegible]
SQL87z403	23-Feb-87	LBor	Lake Borumba	Pttr	0.836	0.095	11.4	0	0	0	0.0
SQL87z404	2-Mar-87	NPD	North Pine Dam	Ptpr	0.746	0.079	10.6	0	0	0	0.0
SQL87z405	24-Mar-87	NPD	North Pine Dam	Ptpr	0.293	0.019	6.5	0	0	0	0.0
SQL87z406	30-Jun-87	LBor	Lake Borumba	Pttr	0.707	0.076	10.7	0	0	0	0.0
SQL87z407	30-Jun-87	LBor	Lake Borumba	Ptcr	1.027	0.107	10.4	0	0	0	0.0
SQL87z408	6-Jul-87	NPD	North Pine Dam	Ptpr	0.609	0.047	7.7	0	0	0	0.0
SQL87z409	22-Sep-87	YabN	Yabba Creek North	Ptpr	1.196	0.127	10.6	0	0	0	0.0
SQL87z410	22-Sep-87	LBor	Lake Borumba	Pttr	1.201	0.095	7.9	0	0	0	0.0
SQL87z411	22-Sep-87	CooC	Coonoon Creek	Ptcr	1.491	0.121	8.1	0	0	0	0.0
SQL87z412	29-Sep-87	MogD	Moogerah Dam	Ptcr	1.222	0.124	10.1	0	8	8	6.5
SQL87z413	18-Nov-87	LBor	Lake Borumba	Pttr	0.709	0.066	9.3	0	0	0	0.0
SQL87z414	30-Nov-87	MogD	Moogerah Dam	Ptcr	1.609	0.176	10.9	3	0	3	[illegible]
SQL87z501	27-Jan-87	LBor	Lake Borumba	Myvr	1.141	0.108	9.5	0	0	0	0.0
SQL87z502	23-Feb-87	LBor	Lake Borumba	Myvr	0.739	0.092	12.4	0	0	0	0.0
SQL87z503	30-Jun-87	LBor	Lake Borumba	Myvr	0.446	0.047	10.5	0	0	0	0.0
SQL87z551	30-Nov-87	SomD	Somerset Dam	Cer	1.679	0.127	7.6	14	9	23	13.7
SQL87z600	27-Jan-87	LBor	Lake Borumba	Naj	0.721	0.069	9.6	0	0	0	0.0
SQL87z601	23-Feb-87	LBor	Lake Borumba	Naj	1.178	0.113	9.6	0	0	0	0.0
SQL87z602	30-Jun-87	LBor	Lake Borumba	Naj	1.197	0.120	10.0	0	0	0	0.0
SQL87z603	13-Jul-87	SomD	Somerset Dam	Naj	1.476	0.234	15.9	0	0	0	[illegible]
SQL87z604	11-Aug-87	LBor	Lake Borumba	Naj	1.782	0.142	8.0	0	0	0	0.0
SQL87z605	22-Sep-87	LBor	Lake Borumba	Naj	1.722	0.196	11.4	0	7	7	[illegible]
SQL87z606	18-Nov-87	LBor	Lake Borumba	Naj	0.894	0.073	8.2	0	4	4	4.5
SQL87z700	27-Jan-87	LBor	Lake Borumba	Ndin	1.312	0.114	8.7	0	0	0	0.0
SQL87z701	23-Feb-87	LBor	Lake Borumba	Ndin	1.206	0.110	9.1	0	0	0	0.0
SQL87z702	2-Mar-87	NPD	North Pine Dam	Ndin	1.248	0.121	9.7	0	0	0	0.0
SQL87z703	23-Mar-87	NPD	North Pine Dam	Ndin	1.596	0.149	9.3	0	0	0	0.0
SQL87z704	30-Jun-87	LBor	Lake Borumba	Ndin	1.507	0.149	9.9	0	0	0	0.0
SQL87z705	6-Jul-87	NPD	North Pine Dam	Ndin	1.414	0.148	10.5	0	0	0	0.0
SQL87z706	3-Aug-87	NPD	North Pine Dam	Ndin	1.671	0.154	9.2	1	0	1	0.6
SQL87z707	11-Aug-87	LBor	Lake Borumba	Ndin	2.031	0.199	9.8	0	0	0	0.0
SQL87z708	22-Sep-87	LBor	Lake Borumba	Ndin	1.803	0.148	8.2	0	0	0	0.0
SQL87z709	18-Nov-87	LBor	Lake Borumba	Ndin	0.955	0.065	6.8	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	kg HSBW
SQL87z800	19-Jan-87	SomD	Somerset Dam	Ldpp	0.917	0.117	12.8	0	0	0	0.0
SQL87z801	23-Feb-87	LBor	Lake Borumba	Ldpp	1.008	0.066	6.5	0	0	0	0.0
SQL88z150	2-Feb-88	OrmP	Ormiston Park	Egr	1.356	0.099	7.3	0	0	0	0.0
SQL88z151	2-Feb-88	ECA	Enoggera Creek-Ashg	Egr	1.689	0.085	5.0	0	0	0	0.0
SQL88z152	2-Feb-88	GolC	Gold Creek	Egr	1.796	0.145	8.1	0	0	0	0.0
SQL88z153	22-Feb-88	OrmP	Ormiston Park	Egr	1.651	0.067	4.1	0	0	0	0.0
SQL88z154	22-Feb-88	ECA	Enoggera Creek-Ashg	Egr	1.478	0.087	5.9	0	0	0	0.0
SQL88z155	22-Feb-88	GolC	Gold Creek	Egr	1.238	0.085	6.9	0	0	0	0.0
SQL88z156	22-Mar-88	OrmP	Ormiston Park	Egr	1.126	0.087	7.7	0	0	0	0.0
SQL88z157	22-Mar-88	ECA	Enoggera Creek-Ashg	Egr	1.247	0.086	6.9	0	0	0	0.0
SQL88z158	22-Mar-88	GolC	Gold Creek	Egr	1.466	0.127	8.7	0	0	0	0.0
SQL88z159	28-Jun-88	ECA	Enoggera Creek-Ashg	Egr	1.798	0.156	8.7	0	0	0	0.0
SQL88z160	12-Aug-88	ECA	Enoggera Creek-Ashg	Egr	2.129	0.133	6.2	0	0	0	0.0
SQL88z161	6-Sep-88	ECA	Enoggera Creek-Ashg	Egr	1.867	0.108	5.8	0	0	0	0.0
SQL88z162	6-Sep-88	OrmP	Ormiston Park	Egr	1.493	0.107	7.2	0	0	0	0.0
SQL88z163	12-Oct-88	ECA	Enoggera Creek-Ashg	Egr	1.193	0.096	8.0	0	0	0	0.0
SQL88z164	12-Oct-88	OrmP	Ormiston Park	Egr	1.759	0.098	5.6	0	0	0	0.0
SQL88z165	2-Nov-88	AtkD	Atkinsons Dam	Otov	0.626	0.083	13.3	0	0	0	0.0
SQL88z166	15-Nov-88	ECA	Enoggera Creek-Ashg	Egr	1.772	0.141	8.0	0	0	0	0.0
SQL88z167	15-Nov-88	OrmP	Ormiston Park	Egr	1.602	0.137	8.6	0	0	0	0.0
SQL88z168	6-Dec-88	ECA	Enoggera Creek-Ashg	Egr	1.984	0.159	8.0	0	0	0	0.0
SQL88z169	6-Dec-88	OrmP	Ormiston Park	Egr	1.804	0.105	5.8	0	0	0	0.0
SQL88z201	19-Jan-88	SomD	Somerset Dam	Hyd	1.756	0.098	5.6	4	250	254	144.6
SQL88z202	19-Jan-88	MarD	Maroon Dam	Hyd	1.460	0.136	9.3	0	6	6	4.1
SQL88z203	19-Jan-88	MogD	Moogerah Dam	Hyd	1.675	0.173	10.3	1	0	1	0.6
SQL88z204	20-Jan-88	MRC	Mary River-Conondal	Hyd	1.350	0.097	7.2	0	0	0	0.0
SQL88z205	20-Jan-88	CooC	Coonoon Creek	Hyd	1.391	0.089	6.4	0	0	0	0.0
SQL88z206	20-Jan-88	YabC	Yabba Creek-Imbil	Hyd	1.198	0.098	8.2	0	0	0	0.0
SQL88z207	20-Jan-88	MRN	Mary River North	Hyd	1.533	0.196	12.8	0	0	0	0.0
SQL88z208	20-Jan-88	NPD	North Pine Dam	Hyd	1.098	0.125	11.4	0	0	0	0.0
SQL88z209	16-Feb-88	SomD	Somerset Dam	Hyd	1.377	0.102	7.4	0	12	12	8.7
SQL88z210	16-Feb-88	MogD	Moogerah Dam	Hyd	1.414	0.162	11.5	0	0	0	0.0
SQL88z211	16-Feb-88	MarD	Maroon Dam	Hyd	1.216	0.077	6.3	0	0	0	0.0
SQL88z212	26-Feb-88	NPD	North Pine Dam	Hyd	1.401	0.112	8.0	0	0	0	0.0
SQL88z213	29-Feb-88	MRN	Mary River North	Hyd	1.255	0.067	5.3	0	0	0	0.0
SQL88z214	29-Feb-88	YabC	Yabba Creek-Imbil	Hyd	1.213	0.069	5.7	0	0	0	0.0
SQL88z215	29-Feb-88	LBor	Lake Borumba	Hyd	1.600	0.192	12.0	2	100	102	63.3
SQL88z216	29-Feb-88	MRC	Mary River-Conondal	Hyd	1.210	0.089	7.4	0	0	0	0.0
SQL88z217	22-Mar-88	GolC	Gold Creek	Hyd	1.233	0.142	11.5	0	0	0	0.0
SQL88z218	12-Aug-88	PetP	Petrie Park	Hyd	1.520	0.136	8.9	0	0	0	0.0
SQL88z219	24-Aug-88	LBor	Lake Borumba	Hyd	1.640	0.100	6.1	1	1	2	1.2
SQL88z220	24-Aug-88	LBor	Lake Borumba	Hyd	1.586	0.095	6.0	0	1	1	0.6
SQL88z221	24-Aug-88	LBor	Lake Borumba	Hyd	1.632	0.250	15.3	10	1	11	6.7
SQL88z222	6-Sep-88	PetP	Petrie Park	Hyd	1.517	0.135	8.9	0	1	1	0.7
SQL88z223	21-Sep-88	MRC	Mary River-Conondal	Hyd	1.436	0.142	9.9	0	0	0	0.0
SQL88z224	21-Sep-88	LBor	Lake Borumba	Hyd	1.476	0.123	8.3	1	7	8	5.4
SQL88z225	21-Sep-88	LBor	Lake Borumba	Hyd	1.581	0.219	13.9	18	17	35	22.1
SQL88z226	12-Oct-88	PetP	Petrie Park	Hyd	1.767	0.099	5.6	5	141	146	82.0
SQL88z227	8-Nov-88	MRC	Mary River-Conondal	Hyd	1.304	0.116	8.9	0	0	0	0.0
SQL88z228	8-Nov-88	LBor	Lake Borumba	Hyd	1.134	0.819	72.2	0	9	9	7.9
SQL88z229	8-Nov-88	LBor	Lake Borumba	Hyd	2.250	0.772	34.3	40	61	101	44.9
SQL88z230	15-Nov-88	PetP	Petrie Park	Hyd	1.653	0.125	7.6	2	2	4	2.4
SQL88z231	6-Dec-88	PetP	Petrie Park	Hyd	1.518	0.100	6.6	1	25	26	17.1
SQL88z350	29-Feb-88	YabC	Yabba Creek-Imbil	Vl?sp	1.022	0.195	19.1	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW l	total HSB	% HSBW
SQL88z351	22-Mar-88	GolC	Gold Creek	Vl?sp	2.075	0.283	13.6	0	0	0	0.0
SQL88z352	21-Sep-88	YabC	Yabba Creek-Imbil	Vl?sp	1.213	0.114	9.4	0	0	0	0.0
SQL88z353	21-Sep-88	LBor	Lake Borumba	Vl?sp	1.566	0.148	9.5	0	0	0	0.0
SQL88z354	2-Nov-88	AtkD	Atkinsons Dam	Vlgi	0.861	0.067	7.8	0	0	0	0.0
SQL88z355	8-Nov-88	LBor	Lake Borumba	Vl?sp	1.903	0.114	6.0	0	0	0	0.0
SQL88z356	15-Nov-88	GolC	Gold Creek	Vl?sp	1.610	0.155	9.6	0	0	0	0.0
SQL88z357	1-Dec-88	GolC	Gold Creek	Vl?sp	1.410	0.215	15.2	0	0	0	0.0
SQL88z401	29-Feb-88	YabC	Yabba Creek-Imbil	Ptpr	1.611	0.100	6.2	0	0	0	0.0
SQL88z402	29-Feb-88	YabC	Yabba Creek-Imbil	Ptcr	1.846	0.159	8.6	0	0	0	0.0
SQL88z403	22-Mar-88	GolC	Gold Creek	Ptcr	1.619	0.153	9.5	0	0	0	0.0
SQL88z404	6-Sep-88	NPD	North Pine Dam	Ptcr	1.662	0.070	4.2	0	0	0	0.0
SQL88z405	21-Sep-88	YabC	Yabba Creek-Imbil	Ptpr	1.071	0.137	12.8	0	0	0	0.0
SQL88z406	21-Sep-88	LBor	Lake Borumba	Pttr	1.634	0.129	7.9	0	0	0	0.0
SQL88z407	12-Oct-88	NPD	North Pine Dam	Ptcr	1.528	0.128	8.4	0	0	0	0.0
SQL88z408	2-Nov-88	AtkD	Atkinsons Dam	Ptoc	1.206	0.099	8.2	0	0	0	0.0
SQL88z409	8-Nov-88	YabC	Yabba Creek-Imbil	Ptpr	1.424	0.107	7.5	0	0	0	0.0
SQL88z600	24-Aug-88	LBor	Lake Borumba	Naj	1.685	0.098	5.8	0	0	0	0.0
SQL88z601	21-Sep-88	LBor	Lake Borumba	Naj	1.502	0.107	7.1	0	2	2	1.3
SQL88z602	8-Nov-88	LBor	Lake Borumba	Naj	1.120	0.064	5.7	0	0	0	0.0
SQL88z700	26-Feb-88	NPD	North Pine Dam	Ndin	1.896	0.147	7.8	0	2	2	1.1
SQL88z701	24-Aug-88	LBor	Lake Borumba	Ndin	1.074	0.096	8.9	0	0	0	0.0
SQL88z702	8-Nov-88	LBor	Lake Borumba	Ndin	1.246	0.113	9.1	0	0	0	0.0
SQL89z150	24-Jan-89	ECA	Enoggera Creek-Ashg	Egr	1.275	0.087	6.8	0	0	0	0.0
SQL89z151	25-Jan-89	OrmP	Ormiston Park	Egr	1.410	0.102	7.2	0	0	0	0.0
SQL89z201	5-Jan-89	MRC	Mary River-Conondal	Hyd	1.411	0.089	6.3	0	0	0	0.0
SQL89z202	9-Jan-89	MogD	Moogerah Dam	Hyd	1.093	0.070	6.4	0	0	0	0.0
SQL89z203	25-Jan-89	PetP	Petrie Park	Hyd	1.570	0.118	7.5	0	0	0	0.0
SQL89z204	8-Mar-89	MRC	Mary River-Conondal	Hyd	1.096	0.182	16.6	0	0	0	0.0
SQL89z205	8-Mar-89	LBor	Lake Borumba	Hyd	1.140	0.188	16.5	0	1	1	0.9
SQL89z206	8-Mar-89	LBor	Lake Borumba	Hyd	2.629	0.629	23.9	125	93	218	82.9
SQL89z207	29-Mar-89	SLG	Saint Lucia Golf Cl	Hyd	1.501	0.224	14.9	0	0	0	0.0
SQL89z208	30-May-89	MarD	Maroon Dam	Hyd	1.282	0.079	6.2	0	0	0	0.0
SQL89z209	30-May-89	MarD	Maroon Dam	Hyd	1.812	0.126	7.0	0	0	0	0.0
SQL89z210	30-May-89	SomD	Somerset Dam	Hyd	3.541	0.312	8.8	1	4	5	1.4
SQL89z211	15-Jun-89	PetP	Petrie Park	Hyd	1.378	0.075	5.4	0	2	2	1.5
SQL89z212	15-Jun-89	NPD	North Pine Dam	Hyd	1.545	0.110	7.1	0	0	0	0.0
SQL89z213	28-Jun-89	PetP	Petrie Park	Hyd	1.043	0.068	6.5	0	0	0	0.0
SQL89z214	28-Jun-89	NPD	North Pine Dam	Hyd	1.846	0.086	4.7	0	0	0	0.0
SQL89z215	4-Jul-89	PetP	Petrie Park	Hyd	0.792	0.050	6.3	0	0	0	0.0
SQL89z216	26-Jul-89	NPD	North Pine Dam	Hyd	1.264	0.082	6.5	0	0	0	0.0
SQL89z217	11-Oct-89	PetP	Petrie Park	Hyd	1.281	0.097	7.6	0	4	4	3.[illegible]
SQL89z218	11-Oct-89	NPD	North Pine Dam	Hyd	1.848	0.103	5.6	0	0	0	0.0
SQL89z219	17-Oct-89	LBor	Lake Borumba	Hyd	1.036	0.146	14.1	0	0	0	0.0
SQL89z220	20-Dec-89	LBor	Lake Borumba	Hyd			ERROR	0	0	0	ERROR
SQL89z350	24-Jan-89	GolC	Gold Creek	Vl?sp	1.323	0.118	8.9	0	0	0	0.0
SQL89z351	17-Oct-89	LBor	Lake Borumba	Vl?sp	0.792	0.060	7.6	0	15	15	18.9
SQL89z352	17-Oct-89	SomD	Somerset Dam	Vl?sp	1.526	0.303	19.9	12	19	31	20.3
SQL89z600	9-Jan-89	MogD	Moogerah Dam	Naj	1.406	0.093	6.6	0	0	0	0.0
SQL89z700	25-Jan-89	OrmP	Ormiston Park	Nymx	1.211	0.088	7.3	0	0	0	0.0
SQL89z701	8-Mar-89	LBor	Lake Borumba	Ndin	1.383	0.125	9.0	0	0	0	0.0
SQL90z101	29-May-90	MogD	Moogerah Dam	Azo	0.500		0.0	0	0	0	0.0
SQL90z102	29-May-90	MarD	Maroon Dam	Azo	0.500		0.0	0	0	0	0.0
SQL90z201	22-May-90	LBor	Lake Borumba	Hyd	1.205	0.142	11.8	0	0	0	0.0
SQL90z202	29-May-90	MogD	Moogerah Dam	Hyd	1.205	0.137	11.4	0	0	0	0.0

Cllec	Date	SCode	Site Name	Hcode	Wet wght	Dry wgh	_ wet w	HSBW ad	HSBW 1	total HSB	kg HSBW
SQL90z203	29-May-90	MarD	Maroon Dam	Hyd	1.304	0.248	19.0	0	0	0	0.0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	1	1	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	man	Elodea canadensis	0	0	0	0	0	0	0	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	man	Triglochin procera	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Elodea canadensis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Triglochin procera	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	4	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	3	0	0	0	0	0	4	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Elodea canadensis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Cabomba caroliniana	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Triglochin procera	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Triglochin procera	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Triglochin procera	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Triglochin procera	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Unknown	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	2	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	99	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	4	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	28	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	6	0	0	0
1	shr	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	19	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla Verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	47	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton perfoliatus	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton ochreatus	0	0	0	0	0	0	18	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	26	0	0	0
1	sub	brl	Potamogeton ochreatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	2	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Potamogeton ochreatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Azolla pinnata?	2	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	7	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	52	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphaea mexicana	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	12	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	157	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	36	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	540	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Nymphaea mexicana	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ludwigia peploides	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ludwigia peploides	0	0	0	0	0	0	3	0	0	0
1	sub	man	Eichhornia crassipes	0	0	0	0	0	0	0	0	0	0
1	sub	man	Salvinia molesta	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	man	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	man	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	4	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	man	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	man	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	man	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	man	Vallisneria gigantea	0	0	0	0	0	0	4	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	5	0	0	0
1	sub	man	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	man	Potamogeton pectinatus?	0	0	0	0	0	0	0	0	0	0
1	sub	man	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	man	Nymphaea mexicana	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Eichhornia crassipes	16	0	0	0	0	0	2	0	0	0
1	sub	brl	Salvinia molesta	18	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	6	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	4	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria Densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	18	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	1	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	11	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	11	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	[illegible]	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	6	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria gigantea	0	0	0	0	0	0	23	0	0	0
1	sub	brl	Vallisneria ?spiralis	[illegible]	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	1	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria gigantea	0	0	0	0	0	0	11	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	86	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria gigantea	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	10	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	18	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	15	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	50	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	35	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton pectinatus?	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	34	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Cabomba caroliniana	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Cabomba caroliniana	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	13	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphaea gigantea	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	12	0	0	0
1	sub	brl	Nymphaea mexicana	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Marsilea drummondii?	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	47	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	9	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	6	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	29	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	34	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	12	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	11	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	9	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Myriophyllum verrucosum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ceratophyllum demersum	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	4	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	11	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.cthe	N.turb	N.resp	N.cthe
1	sub	brl	Ludwigia peploides	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Ludwigia peploides	0	0	0	0	0	0	16	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	2	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	1	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Ottelia ovalifolia	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	5	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	flt	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	10	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	5	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	2	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	5	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria gigantea	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	7	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	28	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	16	0	0	0
1	sub	brl	Potamogeton crispus	1	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Potamogeton tricarinatus	0	0	0	0	0	0	41	0	0	0
1	sub	brl	Potamogeton crispus	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Potamogeton ochreatus	0	0	0	0	0	0	27	0	0	0
1	sub	brl	Potamogeton perfoliatus	0	0	0	0	0	0	4	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	2	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	3	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Egeria densa	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	40	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	17	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	shr	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	8	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	19	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	1	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	1	0	0	0	0	0	2	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	6	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Vallisneria ?spiralis	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Najas tenuifolia	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Nymphaea mexicana	0	0	0	0	0	0	12	0	0	0
1	sub	brl	Nymphoides indica	0	0	0	0	0	0	9	0	0	0
1	flt	brl	Azolla pinnata?	3	0	0	0	0	0	0	0	0	0
1	flt	brl	Azolla pinnata?	53	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	0	0	0	0	0	0	0	0	0	0
1	sub	brl	Hydrilla verticillata	2	0	0	0	0	0	0	0	0	0

smples	where	how	Host sp.	wvl	Aulac	N.erom	Strep	P.dicn	P.nite	P.othe	N.turb	N.resp	N.othe
1	shr	brl	Hydrilla verticillata	1	0	0	0	0	0	0	0	0	0

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	NSW86m201
0	0	0	0	0	NSW86m202
0	0	0	0	0	NSW86m203
0	0	0	0	0	NSW86m204
0	0	0	0	0	NSW86m205
0	0	0	0	0	NSW86m651
0	0	0	0	0	NSW86m652
0	0	0	0	0	NSW86m653
0	0	0	0	0	NSW86m655
0	0	0	0	0	NSW86m656
0	0	0	0	0	NSW86m801
0	0	0	0	0	NSW66m802
0	0	0	0	0	NSW86z201
0	0	0	0	0	NSW86z202
0	3	0	3	0	NSW86z203
0	0	0	0	0	NSW86z204
0	13	14	27	0	NSW86z205
0	0	0	0	0	NSW86z651
0	0	0	0	0	NSW86z652
0	0	0	0	0	NSW86z653
0	0	0	0	0	NSW86z655
0	0	0	0	0	NSW86z656
0	0	0	0	0	NSW86z801
0	0	0	0	0	NSW86z802
0	0	0	0	0	NSW87z150
0	0	0	0	0	NSW87z151
0	0	0	0	0	NSW87z152
0	0	0	0	0	NSW87z153
0	0	0	0	0	NSW87z154
0	0	0	0	0	NSW87z155
0	0	0	0	0	NSW87z156
0	0	0	0	0	NSW87z157
0	0	0	0	0	NSW87z158
0	0	0	0	0	NSW87z159
0	0	0	0	0	NSW87z160
0	0	0	0	0	NSW87z161
0	0	0	0	0	NSW87z162
0	0	0	0	0	NSW87z163
0	0	0	0	0	NSW87z164
0	0	0	0	0	NSW87z165
0	0	0	0	0	NSW87z166
0	0	0	0	0	NSW87z167
0	0	0	0	0	NSW87z168
0	0	0	0	0	NSW87z169
0	0	0	0	0	NSW87z170
0	0	0	0	0	NSW87z171
0	4	3	7	0	NSW87z201
0	16	20	36	0	NSW87z202
0	26	174	200	0	NSW87z203
0	26	0	26	0	NSW87z204
0	93	2	95	0	NSW87z205
0	17	9	26	0	NSW87z206
0	0	0	0	0	NSW87z207
0	0	0	0	0	NSW87z350

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	NSW87z351
0	0	0	0	0	NSW87z352
0	0	0	0	0	NSW87z353
0	0	0	0	0	NSW87z354
0	0	0	0	0	NSW87z355
0	0	0	0	0	NSW87z451
0	0	0	0	0	NSW87z551
0	0	0	0	0	NSW87z552
0	0	0	0	0	NSW87z553
0	0	0	0	0	NSW87z600
0	0	0	0	0	NSW87z601
0	0	0	0	0	NSW87z602
0	0	0	0	0	NSW87z700
0	0	0	0	0	NSW87z701
0	0	0	0	0	NSW87z800
0	0	0	0	0	NSW87z801
0	0	0	0	0	NSW87z802
0	0	0	0	0	NSW87z803
0	0	0	0	0	NSW87z804
1	0	1	1	0	NSW88z150
0	0	0	0	0	NSW88z151
1	0	0	0	0	NSW88z152
0	2	0	2	0	NSW88z153
0	0	0	0	0	NSW88z154
3	0	0	0	0	NSW88z155
0	0	0	0	0	NSW89z155
0	0	0	0	0	NSW88z156
0	0	0	0	0	NSW88z157
0	0	0	0	0	NSW88z158
1	0	0	0	0	NSW88z159
0	0	0	0	0	NSW88z160
0	0	0	0	0	NSW88z161
0	0	0	0	0	NSW88z162
0	0	0	0	0	NSW88z163
0	0	0	0	0	NSW88z164
0	0	0	0	0	NSW88z165
0	0	0	0	0	NSW88z166
0	0	0	0	0	NSW88z201
1	1	1	2	0	NSW88z202
1	0	0	0	0	NSW88z203
0	43	3	46	0	NSW88z204
0	6	15	23	0	NSW88z205
0	1	4	5	0	NSW88z206
0	0	0	0	0	NSW88z350
0	0	0	0	0	NSW88z351
0	0	0	0	0	NSW88z352
0	0	0	0	0	NSW88z353
1	1	0	1	0	NSW88z401
0	0	0	0	0	NSW88z402
0	0	0	0	0	NSW88z403
1	0	0	0	0	NSW88z404
0	0	0	0	0	NSW88z551
0	0	0	0	0	NSW88z600
0	0	0	0	0	NSW89z150

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	NSW89z151
0	0	0	0	0	NSW89z152
0	0	0	0	0	NSW89z153
0	0	0	0	0	NSW89z154
0	0	0	0	0	NSW89z155
0	0	0	0	0	NSW89z156
0	0	0	0	0	NSW89z157
0	0	2	2	0	NSW89z201
0	0	0	0	0	NSW89z202
0	0	0	0	0	NSW89z203
0	0	0	0	0	NSW89z204
0	5	0	5	0	NSW89z205
0	0	0	0	0	NSW89z206
0	0	0	0	0	NSW89z401
0	0	0	0	0	NSW89z402
0	0	0	0	0	NSW90z101
0	0	0	0	0	NSW90z150
0	0	0	0	0	NSW90z201
0	0	0	0	0	NSW90z202
0	0	0	0	0	SQL85m201
0	0	0	0	0	SQL85m202
0	0	0	0	0	SQL85m203
0	0	0	0	0	SQL85m204
0	0	0	0	0	SQL85m205
0	0	0	0	0	SQL85m206
0	0	0	0	0	SQL85m207
0	0	0	0	0	SQL85m208
0	0	0	0	0	SQL85m209
0	0	0	0	0	SQL85m210
0	0	0	0	0	SQL85m211
0	0	0	0	0	SQL85m212
0	0	0	0	0	SQL85m213
0	0	0	0	0	SQL85m214
0	0	0	0	0	SQL85m215
0	0	0	0	0	SQL85m216
0	0	0	0	0	SQL85m217
0	0	0	0	0	SQL85m218
0	0	0	0	0	SQL85m219
0	0	0	0	0	SQL85m220
0	0	0	0	0	SQL85m221
0	0	0	0	0	SQL85m222
0	0	0	0	0	SQL85m223
0	0	0	0	0	SQL85m224
0	0	0	0	0	SQL85m225
0	0	0	0	0	SQL85m226
0	0	0	0	0	SQL85m227
0	0	0	0	0	SQL85m228
0	0	0	0	0	SQL85m229
0	0	0	0	0	SQL85m230
0	0	0	0	0	SQL85m231
0	0	0	0	0	SQL85m232
0	0	0	0	0	SQL85m233
0	0	0	0	0	SQL85m234
0	0	0	0	0	SQL85m235

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	SQL85m236
0	0	0	0	0	SQL85m237
0	0	0	0	0	SQL85m238
0	0	0	0	0	SQL85m239
0	0	0	0	0	SQL85m240
0	0	0	0	0	SQL85m241
0	0	0	0	0	SQL85m242
0	0	0	0	0	SQL85m243
0	0	0	0	0	SQL85m244
0	0	0	0	0	SQL85m245
0	0	0	0	0	SQL85m246
0	0	0	0	0	SQL85m247
0	0	0	0	0	SQL85m248
0	0	0	0	0	SQL85m401
0	0	0	0	0	SQL85m402
0	0	0	0	0	SQL85m403
0	0	0	0	0	SQL85m404
0	1	0	1	0	SQL85m405
0	0	0	0	0	SQL85m406
0	0	0	0	0	SQL85m407
0	0	0	0	0	SQL85m408
0	0	0	0	0	SQL85m701
0	0	0	0	0	SQL85m702
0	0	0	0	0	SQL85m703
0	0	0	0	0	SQL85m801
0	0	0	0	0	SQL85m802
0	0	0	0	0	SQL85z201
0	0	0	0	0	SQL85z202
0	0	0	0	0	SQL85z203
0	0	0	0	0	SQL85z204
0	0	0	0	0	SQL85z205
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0	0	0	0	0	SQL85z210
0	0	0	0	0	SQL85z211
0	0	0	0	0	SQL85z212
0	0	0	0	0	SQL85z213
0	20	0	20	0	SQL85z214
0	0	0	0	0	SQL85z215
0	16	0	16	0	SQL85z216
0	1	0	1	0	SQL85z217
0	1	2	3	0	SQL85z218
0	4	0	4	0	SQL85z219
0	10	14	24	0	SQL85z220
0	0	0	0	0	SQL85z221
0	1	0	1	0	SQL85z222
0	7	1	8	0	SQL85z223
0	0	0	0	0	SQL85z224
0	0	0	0	0	SQL85z225
0	4	0	4	0	SQL85z226
0	0	0	0	0	SQL85z227
0	4	0	4	0	SQL85z228

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	SQL85z229
0	1	0	1	0	SQL85z230
0	0	0	0	0	SQL85z231
0	0	0	0	0	SQL85z232
0	0	0	0	0	SQL85z233
0	0	0	0	0	SQL85z234
0	0	0	0	0	SQL85z235
0	0	1	1	0	SQL85z236
0	7	5	12	0	SQL85z237
0	0	0	0	0	SQL85z238
0	76	1	77	0	SQL85z239
0	6	1	7	0	SQL85z240
0	0	0	0	0	SQL85z241
0	1	2	3	0	SQL85z242
0	1	0	1	0	SQL85z243
0	9	0	9	0	SQL85z244
0	0	0	0	0	SQL85z245
1	6	3	9	0	SQL85z246
0	0	2	2	0	SQL85z247
0	1	15	16	0	SQL85z248
0	0	0	0	0	SQL85z401
0	0	0	0	0	SQL85z402
0	0	0	0	0	SQL85z403
0	1	0	1	0	SQL85z404
0	9	0	9	0	SQL85z405
0	0	0	0	0	SQL85z406
0	9	0	9	0	SQL85z407
6	4	0	4	0	SQL85z408
0	0	0	0	0	SQL85z701
0	0	0	0	0	SQL85z702
0	0	0	0	0	SQL85z703
0	0	0	0	0	SQL85z801
0	0	0	0	0	SQL85z802
0	0	0	0	0	SQL86m101
0	0	0	0	0	SQL86m102
0	0	0	0	0	SQL86m151
0	0	0	0	0	SQL86m152
0	0	0	0	0	SQL86m153
0	0	0	0	0	SQL86m154
0	0	0	0	0	SQL86m155
0	0	1	1	0	SQL86m201
0	0	0	0	0	SQL86m202
0	0	0	0	0	SQL86m203
0	0	0	0	0	SQL86m204
0	0	0	0	0	SQL86m205
0	0	3	3	0	SQL86m206
0	0	0	0	0	SQL86m207
0	0	0	0	0	SQL86m208
0	0	0	0	0	SQL86m209
0	0	0	0	0	SQL86m210
0	0	0	0	0	SQL86m211
0	0	0	0	0	SQL86m212
0	0	0	0	0	SQL86m213
0	0	0	0	0	SQL86m214

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	SQL86m215
0	0	0	0	0	SQL86m216
0	0	0	0	0	SQL86m217
0	0	0	0	0	SQL86m218
0	0	0	0	0	SQL86m219
0	0	0	0	0	SQL86m220
0	0	1	1	0	SQL86m221
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0	0	0	0	0	SQL86m223
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0	0	0	0	0	SQL86m352
0	0	0	0	0	SQL86m353
0	0	0	0	0	SQL86m401
0	0	0	0	0	SQL86m402
0	0	0	0	0	SQL86m403
0	0	0	0	0	SQL86m551
0	0	0	0	0	SQL86m700
0	0	0	0	0	SQL86m701
0	0	0	0	0	SQL86m702
0	0	0	0	0	SQL86z101
0	0	0	0	0	SQL86z102
0	0	0	0	0	SQL86z150
0	0	0	0	0	SQL86z151
0	0	0	0	0	SQL86z152
1	0	0	0	0	SQL86z153
0	0	0	0	0	SQL86z154
0	0	0	0	0	SQL86z155
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0	0	0	0	0	SQL86z166
0	0	0	0	0	SQL86z167
0	0	0	0	0	SQL86z168
0	0	0	0	0	SQL86z169
0	0	0	0	0	SQL86z170
0	0	0	0	0	SQL86z171
0	0	0	0	0	SQL86z172
0	0	0	0	0	SQL86z173
0	0	0	0	0	SQL86z174
0	0	0	0	0	SQL86z175
1	0	0	0	0	SQL86z176
0	0	0	0	0	SQL86z177
0	0	0	0	0	SQl86z178

unid m	lrvHy	adltH	totHyd	Donac	cllc
0	0	0	0	0	SQL86z179
0	0	0	0	0	SQL86z180
0	0	0	0	0	SQL86z181
0	0	0	0	0	SQL86z182
0	0	0	0	0	SQL86z183
0	0	0	0	0	SQL86z184
0	0	0	0	0	SQL86z185
0	0	0	0	0	SQL86z186
0	32	65	97	0	SQL86z201
0	1	1	2	0	SQL86z202
0	2	0	2	0	SQL86z203
0	3	0	3	0	SQL86z204
0	29	93	122	0	SQL86z205
0	7	12	19	0	SQL86z206
1	52	17	69	0	SQL86z207
0	6	2	8	0	SQL86z208
0	5	0	5	0	SQL86z209
0	7	8	15	0	SQL86z210
0	1	1	2	0	SQL86z211
0	0	0	0	0	SQL86z212
0	89	47	136	0	SQL86z213
0	275	56	331	0	SQL86z214
0	3	2	5	0	SQL86z215
0	19	6	25	0	SQL86z216
0	1	0	1	0	SQL86z217
0	36	11	47	0	SQL86z218
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unid m	lrvHy	adltH	totHyd	Donac	cllc
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The surveys conducted for biological control agents of *Hydrilla verticillata* span an 8-year period. A total of 573 quantitative collections of hydrilla were made from 60 sites in costal Queensland and northern New South Wales. An additional 15 quantitative collections of hydrilla were made at 10 sites at Sydney, Mount Isa, and Darwin. Over 100 nonquantitative samples were also taken to supplement the quantitative surveys.

This extensive sampling in Australia has led to the introduction into the United States of two insect biocontrol agents for hydrilla and the potential for other agents. These surveys have also assisted in the introduction of a biocontrol weevil for waterlettuce.

14. SUBJECT TERMS

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